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# Dublin Institute for Advanced Studies

Institiúid Ard-Léinn Bhaile Átha Cliath  
ANNUAL REPORT 2004 TUAIRISC BHLIANTÚIL

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# Chairman's Introduction/ Réamhrá an Chathaoirligh

The year 2004 saw completion of the formal quinquennial review of each School undertaken by panels of distinguished international experts under the Chairmanship of Professor Arthur Jaffe (Harvard University) for Theoretical Physics; Professor Alan Green (ETH, Zurich) for Cosmic Physics and Professor William Gillies for Celtic Studies. The members of the panels were appointed by the Council to ensure that the Institute is presenting the best quality in the provision of their research as well as meeting accountability requirements. The Institute is committed to play its part in creating and supplying research globally and thus provide a platform in its specialist areas for research in Ireland that would give added value from participation in Networks and in scientific and scholarly collaborations. The Schools must be congratulated on the positive reports, which have emanated from these formal reviews. Council greatly appreciates the enormous work and commitment on the part of the Expert Groups and is indebted to them for the helpful and potentially useful suggestions in their Reports.

The exciting new developments foreshadowed a year ago in the Institute's Strategic Plan, the prestigious Fellowship programme funded by the Department of Education and Science has been successfully launched this year and is already seen to be achieving its objective. This programme was positively commented on by all three visiting Expert Panels. The Schrödinger Fellowships in the schools of Theoretical Physics and Cosmic Physics and the Bergin Fellowship in Celtic Studies have attracted international interest and focussed on the research currently being undertaken in the Institute. It is important to capitalise on this recent initiative and very welcome development.

During the year a delightful and happy function took place in Burlington Road, the Institute recognised the importance of our young Scholars and had pleasure presenting these young researchers with medals indicative of the part they were playing in progressing scholarship within the three Schools. The scholars in the Science schools were named Hamilton Scholars and O'Donovan Scholars in Celtic Studies. The function was attended by the parents or guardians of the students. The Institute was honoured to have Dr T.K.Whittaker the former Chairman of Council to make the presentations. Dr Whittaker in his speech summarised succinctly the history of the Institute and explained the importance of investing in the Institutes long-term reputation by fostering a strong sense of ethical and responsible behaviour in carrying out research.

Sa bhliain 2004 tugadh athbhreithniú foirmiúil cúigbhliantúil ar gach Scoil chun críche, a rinne painéil de shaineolaithe céimiúla idirnáisiúnta faoi Chathaoirleacht Arthur Jaffe (Ollscoil Harvard), Ollamh le Fisic Theoiriciúil; Alan Green (ETH, Zürich) Ollamh le Fisic Chosmach agus William Gillies, Ollamh leis an Léann Ceilteach. Is í an Chomhairle a cheap comhaltaí na bpainéal lena chinntiú go gcuireann an Institiúid sárcháilíocht i bhfeidhm maidir le soláthar taighde agus go gcomhlíonann sí na ceanglais chuntasachta. Tá an Institiúid tiomanta a páirt a imirt maidir le taighde a chruthú agus a sholáthar go domhanda agus ar an tslí sin ardán a thabhairt ina sainréimsí do thaighde in Éirinn a thabharfadh luach breise ó rannpháirtíocht i Líonraí agus i gcomhoibriú eolaíochtúil agus scolártha. Caithfear comhghairdeas a dhéanamh leis na Scoileanna ar na tuairiscí dearfacha a d'eascair as na hathbhreithnuithe foirmiúla sin. Tá an Chomhairle fíorbhuíoch de thiomantas na nGrúpaí Saineolaithe agus den mhéid oibre a rinne siad agus tá sí faoi chomaoín acu as na moltaí cuiditheacha, agus a d'fhéadfadh a bheith úsáideach a bhí ina gcuid Tuarascálacha.

Seoladh go rathúil i mbliana forbairtí nua spreagúla a luadh anuraidh i bPlean Straitéiseach na hInstitiúide, clár Comhaltachta mór le rá, arna mhaoiniú ag an Roinn Oideachais agus Eolaíochta, agus is léir cheana féin go bhfuil a chuspóir á bhaint amach aige. Thrácht gach ceann de na trí Phainéal Saineolaithe go dearfach ar an gclár sin. Tá suim idirnáisiúnta meallta ag Comhaltachtaí Schrödinger i scoileanna na Fisice Teoiriciúla agus na Fisice Cosmaí agus ag Comhaltacht Bergin sa Léann Ceilteach agus dhírigh siad isteach ar an taighde atá ar siúl faoi láthair san Institiúid. Tá sé tábhachtach buntáiste a bhaint as an nua-thionscnamh sin, forbairt a bhfuil an-fháilte roimpi.

Thug an Institiúid aitheantas do thábhacht ár Scoláirí óga ag ócáid shóisialta aoibhinn i mBóthar Burlington, agus ba mhór ag an Institiúid boinn a bhronnadh ar na taighdeoirí óga sin mar léiriú ar a bpáirt i gcur chun cinn an léinn laistigh de na trí Scoil. Tugadh teideal Scoláirí Hamaltúin do na scoláirí sna scoileanna Eolaíochta agus Scoláirí Uí Dhonnabháin do scoláirí an Léinn Cheiltigh. D'fhreastail tuismitheoirí agus caomhnóirí na mac léinn ar na ócáid. Ba mhór an onór don Institiúid gurbh é an Dr. T.K.Whittaker, iar-Chathaoirleach na Comhairle a bhronn na boinn. Thug an Dr. Whittaker achoimre gonta ar stair na hInstitiúide ina óráid agus mhínigh sé an tábhacht a bhaineann le hinfheistiú i gclú fadtéarmaigh na hInstitiúide trí bhéim láidir ar iompar eiticiúil agus freagrach a chur chun cinn nuair a bítear i mbun taighde.

The successes in the School of Cosmic Physics in achieving increased funds for research through the unfreezing of capital funds for PRTL cycle three in the Cosmo Grid project and in being chosen to lead the EU Marie Curie Research Training Network JETSET as well as the additional manpower in Geophysics with Professor Alan Jones has emphasised the urgent need for additional accommodation. Unfortunately an expansion on the Institute's existing sites at Merrion Square and Burlington Road is not feasible.

In this report in 2001 we wished Professor John Lewis every success in the award to him of the prestigious Science Foundation Ireland Fellowship to progress the foundation of the Communications Network Research Institute. John achieved this ambition. Concurrently with this proposed fundamental study John was achieving success with his technology company Courville. The Institute was proud to recognise his successes. John's belief in the importance of the fundamental research that had originated in the School of Theoretical Physics and his vision of its potential as a relevant technology was outstanding. It is with deep sorrow we record John's passing in early January of 2004. Professor Lewis acted as Director of the School of Theoretical Physics for some 18 years and was a member of Council during that time.

A former director of the School of Celtic Studies, Professor Proinsias MacCana who was a former member of Council died suddenly on 21st May 2004. Proinsias who had retired in 1996 but had continued to work in the School right up to his death. His wise counsel, shrewd advice, friendship and very happy disposition are missed by all of us in the Institute.

Council thanks the Department of Education and Science for the continued interest in work of the Institute.

The Institute looks forward to the future with confidence. We have a clear and compelling strategy incorporating exciting research programmes the successful implementation of which will be important in the future of the Institute. I take this opportunity to thank the members of Council, the Governing Boards, the academics and scholars and wish to pay tribute to the staff for their hard work and loyalty.

Tá béim curtha ar an ngá práinneach atá le cóiríocht bhreise a fháil, ar chomh maith agus a d'éirigh le Scoil na Fisice Cosmaí maoiniú breise a fháil le haghaidh taighde trí chistí caipitil do chéim a trí PRTL i dtionscadal Cosmo Grid a shaoradh agus gur roghnaíodh í a bheith i gceannas ar an Lónra Oiliúna Taighde Marie Curie JETSET de chuid an AE chomh maith leis an gcúnamh breise sa Gheofisic leis an Ollamh Alan Jones. Níl sé indéanta áfach, síneadh a chur ar shuímh na hInstitiúide i gCearnóg Mhuirfean agus ag Bóthar Burlington.

I dtuarascáil bhliantúil na bliana 2001 ghuómair gach rath ar an Ollamh John Lewis nuair a dámhaidh Comhaltacht cháiliúil Fhondúireacht Eolaíochta na hÉireann air chun bunú An Institiúid um Thaighde ar an Lónra Cumarsáide a chur chun cinn. D'éirigh le John é sin a bhaint amach. Bhí an rath ar John lena chuideachta teicneolaíochta Courville ag an am céanna leis an staidéar bunúsach beartaithe sin. Bhí an Institiúid bródúil aitheantas a thabhairt don méid dár éirigh leis a bhaint amach. Bhí creideamh iontach ag John i dtábhacht na taighde bunúsaí a thosaigh i Scoil na Fisice Teoiriciúla agus bhí fíis iontach aige den chumas atá aici a bheith ina teicneolaíocht ábhartha. Is faoi bhrón agus faoi bhuaire a mheabhraimid bás John go luath in Eanáir na bliana 2004. Bhí an tOllamh Lewis ina Stiúrthóir ar Scoil na Fisice Teoiriciúla ar feadh 18 bliain agus bhí sé ina chomhalta den Chomhairle i rith an ama sin.

Fuair an tOllamh Proinsias MacCana, iar-stiúrthóir ar Scoil an Léinn Cheiltigh agus iar-chomhalta den Chomhairle bás tobann an 21ú Bealtaine 2004. Scor Proinsias i 1996 ach lean sé air ag obair sa Scoil go dtí gur bhásaigh sé. Airímid uile san Institiúid uainn Proinsias, a dhea-phearsantacht, a chomhairle chríonna, mheabhrach agus a chairdeas.

Gabhann an Chomhairle buíochas leis an Roinn Oideachais agus Eolaíochta as a spéis leanúnach in obair na hInstitiúide.

Tá an Institiúid ag féachaint chun cinn go muineach don am atá amach romhainn. Tá straitéis shoiléir, láidir againn lena mbaineann cláir thaighde spreagúla agus beidh feidhmiú rathúil na straitéise sin tábhachtach i dtodhchaí na hInstitiúide. Tapaim an deis seo buíochas a ghlacadh le comhaltaí na Comhairle, leis na Boird Cheannais, leis an lucht acadúil agus leis na scoláirí agus ba mhian liom aitheantas a thabhairt don fhoireann as a ndianobair agus as a ndílseacht.



# School of Celtic Studies/ Scoil an Léinn Cheiltigh

The year 2004 saw the publication of Arndt Wigger's two-volume work *Caint Ros Muc*, which makes available a substantial corpus of spoken Irish based on recordings made in Connemara in 1964. This work provides important source material for linguists, folklorists and social historians.

The ongoing demand for our publications means that a considerable amount of time and effort must be devoted to providing reprints and ensuring that they are of the highest possible standard. Books reprinted this year were: *Immrama*, *Miscellaneous Irish Annals*, *Scéla Mucce Meic Dathó*, *Táin Bó Cuailnge* from the Book of Leinster, *The Annals of Ulster*, *The Patrician Texts in the Book of Armagh*, and *The Place-names of County Wicklow* volume 6.

The Irish Script on Screen (ISOS) project continued under the direction of Professor Pádraig Ó Macháin. This year saw the departure in April of one of our digitisers, Colin Dunn, after three years of dedicated service to the project, which now has a single digitiser, Anne Marie O'Brien. A major step was taken when responsibility for the hosting of the ISOS website ([www.isos.dias.ie](http://www.isos.dias.ie)) switched from Dublin City University to the Dublin Institute for Advanced Studies. ISOS is now hosted from a server located in the School of Cosmic Physics in Merrion Square. The ISOS website was re-designed and re-organised in the first half of the year, in order to facilitate access, and to improve clarity of content. To date, the total number of individual images available on the site is in excess of 22,000. Visits to the site in 2004 numbered 1.5 million.

Digitising work continued on the Franciscan collection of Irish manuscripts in the Department of Archives, University College Dublin. Work was also begun, during the year, on the re-organisation of the archive of digital material created by ISOS, and stored on disk and tape.

Sa bhliain 2004 foilsíodh an dá imleabhar de *Caint Ros Muc* leis an Dr Arndt Wigger, ina gcuirtear ar fáil corpas tábhachtach den Ghaeilge labhartha bunaithe ar ábhar a taifeadh i nGaeltacht Chonamara sa bhliain 1964. Is díol spéise ábhar an dá imleabhar seo, hí hamháin don teangeolaí ach do lucht an bhéaloidis agus do lucht na staire sóisialta chomh maith.

Bíonn éileamh leanúnach ar ár gcuid foilseachán, agus caitear mórán ama agus dua lena chinntiú go soláthraítear athchlónna den chaighdeán is airde. Siad na leabhair a cuireadh i gcló arís sa tréimhse seo ná: *Immrama*, *Miscellaneous Irish Annals*, *Scéla Mucce Meic Dathó*, *Táin Bó Cuailnge* from the Book of Leinster, *The Annals of Ulster*, *The Patrician Texts in the Book of Armagh*, agus *The Place-names of County Wicklow* volume 6.

Lean an tionscnamh Meamram Páipéar Riomhaire (MPR) ar aghaidh faoi stiúir an Ollaimh Pádraig Ó Macháin. In Aibreán na bliana seo d'imigh duine dár ndigiteoirí, Colin Dunn, tar éis trí bliana a chaitheamh ag obair go dúthrachtach don tionscnamh, agus anois níl ach an t-aon digiteoir againn, .i. Anne Marie O'Brien.

Céim thábhachtach ab ea é nuair a aistríodh óstaíocht shuíomh idirlín MPR ([www.isos.dias.ie](http://www.isos.dias.ie)) ó Ollscoil Chathair Bhaile Átha Cliath go dtí Institiúid Ard-Léinn Bhaile Átha Cliath. Déantar óstaíocht ar MPR anois ó fhreastalaí atá lonnaithe i Scoil na Fisice Cosmaí i gCearnóg Mhuirfean. Rinneadh athdhearadh agus atheagrú ar shuíomh idirlín MPR sa chéad leath den bhliain chun rochtain a éascú agus soiléireacht an inneachair a fheabhsú. Faoi dheireadh na bliana bhí níos mó ná 22,000 íomhánna ar fáil ar an suíomh. Sa bhliain 2004 tugadh cuairt ar an suíomh 1.5 milliún uair.

Leanadh de dhigitiú i mbailiúchán na bProinsiasach de lámhscríbhinní Gaeilge i Roinn na gCartlann, An



The completion and display of the NUI Galway component of the ISOS project was marked at a reception in Galway on June 21 attended by Professor Ó Macháin and Anne Marie O'Brien, and addressed by Professor Breandán Ó Madagáin, Chairman of the Board of the School of Celtic Studies.

An innovation this year was the organisation and hosting of the 'Digital Image, Digital Text' colloquium on December 4. The papers attracted an average attendance of sixty people, drawn from the scholarly, scientific and archival communities.

The School's website ([www.celt.dias.ie](http://www.celt.dias.ie)), managed by Professor Ó Macháin and Andrew McCarthy, continued to grow in 2004, and was greatly enhanced by the addition of the electronic version of Rolf Baumgarten's *Bibliography of Irish Language and Literature*, which was launched on November 19. The site moved to a new server in the School of Cosmic Physics, and response times have vastly improved as a result. Just over 67,000 pages were served in our electronic publications, a growth of 29% on the previous year. The single most popular electronic publication was Brian Ó Cuív's *Catalogue of Irish Language Manuscripts in the Bodleian Library at Oxford and Oxford College Libraries*. The most popular areas on the site as a whole were *Celtica* and the catalogue of publications. The search engine now indexes over 12,500 pages from 20 academic sites. During the year the site served 182,000 pages.

Professor Malachy McKenna and Dr Brian Ó Curnáin continued their work on Modern Irish dialect studies, respectively carrying out field-work in Counties Donegal and Galway. Roibeard Ó Maolalaigh continued work on the Bibliography of Irish Linguistics and Literature Project. In the area of Early Irish law Professor Liam

Coláiste Ollscoile, Baile Átha Cliath. Chomh maith leis sin, cuireadh tús i gcaitheamh na bliana ar atheagrú chartlann an ábhair dhigitigh a chuir MPR le chéile agus atá i dtaisce ar dhiosca agus ar théip.

Comóradh críochnú agus cur ar taispeáint comhábhar ONÉ Gaillimh den tionscnamh ag fáiltiú sa Ghaillimh ar an 21 Meitheamh, ina raibh an tOllamh Ó Macháin agus Anne Marie O'Brien i láthair agus inar thug an tOllamh Breandán Ó Madagáin, Cathaoirleach Scoil an Léinn Cheiltigh aitheasc.

Nuáil i mbliana ab ea eagrú agus óstaíocht na comhdhála aon lae 'Digital Image, Digital Text' ar an 4 Nollaig. Seasca duine ar meán ab ea líon an lucht éisteachta a bhí i láthair ag na páipéir, agus lucht léinn na n-ealaíon, na heolaíochta agus cartlannaithe ina measc.

Lean suíomh idirlín na Scoile ([www.celt.dias.ie](http://www.celt.dias.ie)) ag fás faoi stiúir Phádraig Uí Mhacháin agus Andrew McCarthy sa bhliain 2004, agus chuir leagan leictreonach an *Bibliography of Irish Language and Literature* de chuid Rolf Baumgarten, a seoladh ar an 19 Samhain, go mór leis an dtionscnamh seo.

Aistríodh an suíomh go dtí freastalaí nua i Scoil na Fisice Cosmaí, agus tháinig feabhas suntasach ar agaí freagartha dá bharr. Rinneadh freastal ar níos mó ná 67,000 leathanach in ár gcuid foilseachán leictreonach, méadú de 29% ar líon na bliana roimhe sin. Ba é an *Catalogue of Irish Language Manuscripts in the Bodleian Library at Oxford and Oxford College Libraries* de chuid Bhriain Uí Chuív an foilseachán leictreonach is mó a raibh éileamh air. Ba iad *Celtica* agus catalóg na bhfoilseachán na réimsí is mó a raibh éileamh orthu ar an suíomh ina iomláine. Déanann an t-inneall cuardaigh innéacsú anois ar níos mó ná 12,500 leathanach as 20



Professor Toshitsugu Matsuoka, Hosei University, Tokyo attending the Tionól. An tOllamh Toshitsugu Matsuoka, Ollscoil Hosei, Tokyo ag an Tionól.

Breatnach gave a series of seminars on the Old Irish law tract *Córus Bésgnai*, an edition of which he intends to publish in the Early Irish Law Series, and prepared the copy of his *Companion to the Corpus Iuris Hibernici* for the printers, while Professor Fergus Kelly continued work on his edition of the thirteenth-century *Legal Treatise* by Giolla na Naomh Mac Aodhagáin, again for publication in the Early Irish Law Series.

This year's Tionól was a truly international event with speakers from Ireland, England, The Netherlands, Israel, The United States and Australia. It was a great success both in the standard of the papers presented and in the particularly high attendance, with some sessions attracting audiences well in excess of one hundred people. So also was the Statutory Public Lecture held in conjunction with the Tionól, delivered in University College Dublin by Professor Tomás Ó Cathasaigh of Harvard University under the title 'The Body in *Táin Bó Cúailnge*'.

For their part, members of the School gave lectures at conferences in Aberdeen, Belfast, Edinburgh, Galway, Kilkenny, Maynooth and Uppsala.

suíomh acadúil. I gcaitheamh na bliana rinne an suíomh freastal ar 182,000 leathanach.

Lean an tOllamh Malachy McKenna agus an Dr Brian Ó Curnáin ar thaighde ar chanúintí na Nua-Ghaeilge, agus rinne siad obair pháirce i gContae Dhún na nGall agus i gContae na Gaillimhe faoi seach. Choinnigh Roibeard Ó Maolalaigh air ag obair ar thionscnamh Bhibleagrafaíocht Theangeolaíocht is Litríocht na Gaeilge. Maidir le sean-dlithe na hÉireann, thug an tOllamh Liam Breatnach sraith seimineár ar an dtéacs dlí Sean-Ghaeilge *Córus Bésgnai*, téacs a bhfuil sé i gceist aige eagrán de a fhoilsiú san Early Irish Law Series, agus chuir sé a leabhar, *A Companion to the Corpus Iuris Hibernici*, in oiriúint do na clódóirí. Choinnigh an tOllamh Fergus Kelly air ag obair ar eagrán den Tráchtas Dlí de chuid Giolla na Naomh Mhic Aodhagáin, a bhaineann leis an 13ú haois; arís is san *Early Irish Law Series* atá sé seo le foilsiú.

Comhdháil fhíor-idirnáisiúnta ab ea Tionól na bliana seo, le cainteoirí as Éirinn, Sasana, an Ísiltír, Iosrael, Na Stáit Aontaithe agus an Astráil. D'éirigh thar cionn leis, ní hamháin maidir le caighdeán na bpáipéar a léadh, ach freisin le líon mór an lucht éisteachta; ag cuid de na seisiúin bhí go mór thar céad duine i láthair. Is maith a d'éirigh freisin leis an Léacht Reachtúil a tugadh in éineacht leis an dTionól. Sé an tOllamh Tomás Ó Cathasaigh as Ollscoil Harvard a labhair ar an ócáid seo sa Choláiste Ollscoile, Baile Átha Cliath, faoin teideal 'The Body in *Táin Bó Cúailnge*'.

Ar an dtaobh eile, thug baill den Scoil léachtanna ag comhdhálacha in Obar Dheathain, Béal Feirste, Gaillimh, Cill Choinnigh, Maigh Nuad agus Uppsala.



A major event for the School was the external review conducted from the 1st to the 3rd of September, by a panel drawn from University College Cork, Edinburgh, Harvard, Oxford universities and City University of New York. Members of the School found it a very useful exercise which will contribute to the future development of the School of Celtic Studies, and were gratified by what they felt was a very positive assessment of the role of the School.

The death occurred on the 21st of May of Professor Proinsias Mac Cana, former Director of the School. He was appointed Senior Professor in 1985 and continued working in the School from his retirement in 1996 right up to his death, making an especially valuable contribution to the work of the School in his capacity as editor of the Mediaeval and Modern Welsh series.

Cleachtadh an-tábhachtach don Scoil ab ea an measúnú seachtarach a rinneadh uirthi idir an 1ú agus an 3ú Meán Fómhair. Ar an bpainéal bhí scoláirí as an Coláiste Ollscoile Corcaigh, ollscoileanna Dún Éideann, Harvard, Oxford agus City University of New York.

Mheas baill na Scoile gur chleachtadh tairbheach a bhí ann a chuirfidh le forbairt Scoil an Léinn Cheiltigh sna blianta atá le teacht, agus ba mhór acu an measúnú deimhneach a rinneadh ar an Scoil.

Ar an 21ú Bealtaine fuair an tOllamh Proinsias Mac Cana, iar-stiúrthóir na Scoile, bás. Ceapadh ina Ollamh Sinsearach sa bhliain 1985 é, agus lean sé air ag obair sa Scoil ón uair a d'éirigh sé as an ollúnacht shinsearach go dtí lá a bháis, agus thug sé cuidiú ar leith d'obair na Scoile mar eagarthóir ar an Mediaeval and Modern Welsh series.



Professor Arndt Wigger interviewed by RTÉ at the launch of his book *Caint Ros Muc*  
*An tOllamh Arndt Wigger á chur faoi agallamh ag RTÉ ag seoladh Caint Ros Muc*



Professor Proinsias Mac Cana (1926-2004)  
*An tOllamh Proinsias Mac Cana (1926-2004)*

# School of Cosmic Physics/ Scoil na Fisice Cosmaí

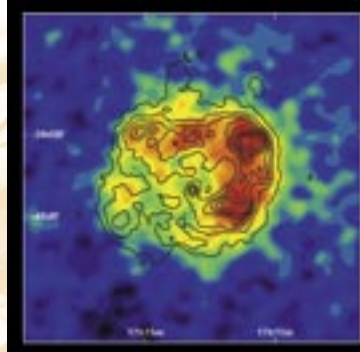


A number of collaborative projects of the Astronomy and Astrophysics sections recorded significant advances during the year. The Rapid Eye Mount telescope, an Italian-lead project to develop a robotic telescope with near infra-red capabilities to study gamma-ray burst afterglows, completed its commissioning phase in October and is now responding automatically to triggers from the Swift satellite. Gamma-ray bursts are the most powerful explosions in the Universe and appear to be related, in at least some cases, to an exceptionally powerful class of supernova-like events, sometimes called hypernovae. Studies of high-resolution spectroscopic data obtained from one burst, GB021004, indicate the presence of a complex and clumpy environment around the burst, which is probably related to strong winds and mass-loss from the burst progenitor star. In a related area, in collaboration with UCD and CIT, an optical CCD camera has been installed in Abastumani observatory in Georgia for follow-up studies of afterglows.

The first phase of the HESS system of Imaging Atmospheric Cherenkov telescopes in Namibia, a mainly German-French collaboration in which the Institute is a participant, was completed in December 2003 and started full operations in 2004. Even using only data taken during the commissioning phase and first few months of operation very exciting science results were obtained, including the first spatially resolved TeV gamma-ray image of an active astronomical source, the shell-type supernova remnant RXJ1713-3946 (which was reported in a letter to Nature), a strong detection of the Galactic centre, the first observations of a time-varying Galactic source (the pulsar B1259-63 which is in orbit around a Be star) and, perhaps most interestingly, clear detections of several unidentified Galactic sources.

Rinne comhthionscadail de chuid Roinn na Réaltéolaíochta agus Roinn na Réaltfhisice dul chun cinn suntasacha le linn na bliana. Tháinig críoch le céim choimisiúnaithe Rapid Eye Mount Telescope, tionscadal atá faoi stiúir na hIodáile chun teileascóp le cumais ghearr-infridhearga chun staidéar a dhéanamh ar roiseanna iarlaomanna gháma-ghathanna, i nDeireadh Fómhair agus tá sé ag freagairt anois go huathoibríoch do thruicir ó shatailít Swift. Is iad roiseanna gháma-ghathanna na pléascanna is cumhachtaí ar Domhan agus shílfeá go bhfuil baint acu, i roinnt cásanna ar aon nós, le himeachtaí cosúil le cineál ollnóva thar a bheith cumhachtach, ar a dtugtar hipearnóbha. Tugann staidéir a rinneadh ar shonraí speictreascópach ardaifeach a fuarthas ó rois amháin, GB021004, le tuiscint go mbíonn timpeallacht chasta agus mhealltrach ag an rois agus go mbaineann sé sin b'fhéidir le gaoithí láidre agus le caillteanas maise ón réalta sinsearach roise. I réimse a bhaineann leis seo, i gcomhar le UCD agus CIT suiteáladh ceamara CCD i saotharlann Abastumani i Georgia chun staidéar a dhéanamh ar iarlaomanna.

Tugadh an chéad chéim den chóras HESS Telescópanna Cherenkov d'íomhú Atmaisféir i Namibia, obair i gcomhar idir An Fhrainc agus an Ghearmáin ach a bhfuil an Institiúid rannpháirteach ann, chun críche i Nollaig 2003 agus cuireadh tús le hoibríochtaí iomlána i 2004. Fuarthas torthaí iontacha eolaíochta as na sonraí a tógadh le linn na céime coimisiúnaithe agus sna chéad chúpla mí a raibh sé i bhfeidhm lena n-áirítear an chéad íomhá gháma-ghath TeVa d'fhoinsé réalteolaíochta gníomhach a réitíodh go spásúil, an sceallchineálach d'iarsma ollnóva RXJ1713-3946 (a tuairiscíodh i litir chuig Nature), aimsiú láidir d'ionad Réaltrach, na chéad bhreathnadóireachtaí ar fhoinsé Réaltrach amathraitheach (an pulsár B1259-63 atá i bhfithis timpeall ar réalta Be) agus an rud is suimiúla ar fad aimsiú soiléir ar roinnt foinsí Réaltrach neamhaitheanta.



First resolved image of a supernova remnant as seen in very high energy gamma-rays by the HESS telescopes in Namibia. *An chéad íomhá inaitheanta d'iarsma supernova i ngáma-ghathanna ardhuinnimh mar a chonaic na teileascóp HESS i Namibia í.*



Public Outreach. Public nights in Dunsink Observatory by staff of the Astronomy and Astrophysics section. *Síneadh amach. Oícheanta pobail i Réadlann Dhún Sionca ag foireann Rannóg na Réalteolaíochta agus na Réaltfhisice*

In the CosmoGrid project, following the “unfreezing” of capital funding for PRTL cycle three projects at the end of 2003, the position of Dublin cluster manager was filled and a European tender issued for the supply of the first large computer cluster. Following evaluation of the tenders the contract was awarded to IBM/OCF and the system was due for installation in UCD at year-end. The CosmoGrid team played a major role in helping SFI and Enterprise Ireland to organise the meeting of the e-Infrastructures reflection group, an EU advisory body, as part of the Irish presidency. Associated with this meeting was the launch of the EGEE project, which took place in Cork immediately after the e-Infrastructures, meeting in Dublin.

During the year, the Astrophysics Section was chosen by the European Union to lead a Marie Curie Research Training Network known as JETSET (Understanding Jets through Simulation, Experiment and Theory). Funding of approximately 3.8 Million Euro has been assigned to the project over four years starting in February 2005. The primary aim of JETSET is to build an interdisciplinary European research and training community centred on plasma jet studies, with a focus on outflows from young stars. The network will bring together astrophysical observations, theoretical and computational modelling, laboratory experiments, and Grid technology. The core strategy of the network will be to create, for the first time, an interdisciplinary European team spanning these domains and use it to break new ground in several key areas related to plasma jets, both in space and in the laboratory. Its main scientific goals will focus on understanding the driving mechanisms of jets around young stars (including their possible crucial link with planet-forming disks); the cooling/heating processes, instabilities and shock structures in stellar and lab jets; and the impact of jets on energy balance and star formation in the

Maidir leis an tionscadal CosmoGrid agus i ndiaidh maoiniú caipitil do thionscadail shraith trí PRTL a “scaoileadh” ag deireadh 2003, líonadh post bainisteoir braisle Bhaile Átha Cliath agus eisíodh tairiscint Eorpach do sholáthar na céad bhraisle mór ríomhaire. I ndiaidh na dtairiscintí a mheas bronnadh an conradh ar IBM/OCF agus bhí an córas le suiteáil i UCD ag deireadh na bliana. Bhí ról mór ag foireann CosmoGrid ó thaobh cuidiú leis an SFI agus le Enterprise Ireland cruinniú ghrúpa athmhachnaimh r-Infrastruchtúir, comhlacht comhairleach AE, a eagrú mar chuid d’Uachtaránacht na hÉireann. Bhí baint freisin ag seoladh thionscadal EGEE a reachtáladh i gCorcaigh díreach i ndiaidh chruinniú r-Infrastruchtúir i mBaile Átha Cliath, leis.

Le linn na bliana roghnaigh an tAontas Eorpach Roinn na Réaltfhisice chun Líonra Oiliúna Taighde Marie Curie darb ainm JETSET ((Understanding Jets through Simulation, Experiment and Theory) a stiúradh. Sainníodh maoiniú de thart ar 3.8 milliún euro don tionscadal thar cheithre bliana ag tosú i Feabhra 2005. Is é príomhaidhm JETSET ná pobal oiliúna agus taighde Eorpach bunaithe ar staidéir scairde plasma agus an fócas ar eisreabhadh ó réaltaí óga a bhunú. Tabharfaidh an líonra le chéile breathnadóireachtaí réaltfhisice, samhaltú teoirice agus uimhríochta, turgnaimh shaotharlainne, agus teicneolaíocht Grid. Is í príomhshraitéis an líonra ná, don chéad uair riamh, foireann Eorpach idirdhisciplíne ar na réimsí sin a chur le chéile agus leas a bhaint as an bhfoireann chun obair nua a thosú sna príomhréimsí a bhaineann le scaird plasma, sa spás chomh maith le sa tsaotharlann. Díreoidh príomhspríocanna eolaíochta an ghrúpa ar tuiscint a fháil ar mheicníochtaí a thiomáineann na scairdeanna thart ar réaltaí óga (lena n-áirítear an nasc tábhachtach a d’fhéadfadh a bheith acu le díoscanna foirmithe plainéad); na próisis téite/fuaraithe, éagobhasaíochtaí agus struchtúir thurrainge





Opening of the EGEE Conference. *Ocáid oscailte Chomhdháil EGEE*

interstellar medium. Results will include: unique sets of theoretical models for jet production with synthetic predictions; coordinated databases of multi-wavelength jet observations; complete sets of laser and pulsed power device experimental benchmarks; cross-validated simulation codes; and the setting up of European Grid computing facilities to work on jets. Vacancies for 11 Early Stage Researchers (PhD studentships) and 7 Experienced Researchers (Post-doctoral positions) will be advertised early in 2005. The other JETSET partners include institutions in France, Germany, Greece, Italy, Portugal, Spain and the UK.

The power of parallel processing was amply demonstrated by its use to analyse vast quantities of catalogue data from a recently completed near-infrared survey of the sky. By comparing the number of stars in a region with the background, it was possible to find numerous clouds of gas and dust in the Plane of the Milky Way as well as large numbers of hitherto unknown stellar clusters. Using data in different colours, it was also possible to determine fundamental properties of the dust contained in Galactic molecular clouds.

The Astrophysics Section, using ultra-violet data from the Hubble Space Telescope and more recently the Very Large Telescope (VLT) in Chile, have discovered increasing evidence that jets from young stars rotate. They have found that not only does the core-ionised component of the jet rotate but molecular gas on its peripheries as well. The amount of rotation observed suggests that jets are the primary mechanism for removing angular momentum from young stars, at least at the stage when the star becomes optically visible. The group, using observations carried out with the VLT, are also attempting to find the first ever evidence for outflows from newly formed brown dwarfs. Brown dwarfs are so-called "failed stars"; their masses are too

i scairdeanna saotharlainne agus réaltacha; agus an tionchar a bhíonn ag scairdeanna ar chothromaíocht fuinnimh agus foirmiú réalta sa mheán idir-réaltach. Áireofar ar thorthaí: tacair uathúla de shamhaltacha teoiriciúla do tháirgeadh scairde le réamhinsintí sintéiseacha; bunachair shonraí chomhordaithe de bhreathnadóireachtaí scairdeanna il-thonnfhad; tacair iomlána de bhinsemaire turgnamhacha fearais phuilschumhachta agus sraith iomlán léasair; cóid imshamhalta tras-bhailí; agus bunú saoráidí ríomhraithe Ghreille Eorpach chun obair a dhéanamh ar scairdeanna. Fógrófar postanna do 11 Taighdeoirí Luathchéime (mic léinn PhD) agus 7 Taighdeoirí le Taithí (postanna Iar-dhochtúireachta) go luath i 2005. Áirítear ar pháirtneirí eile JETSET institiúidí sa Fhrainc, sa Ghearmáin, sa Ghréig, san Iodáil, sa Phoairtingéil, sa Spáinn agus sa RA.

Léiríodh an chumhacht a bhaineann le próiseáil chomhthreomhar trí úsáid a bhaint as chun anailís a dhéanamh ar mhéideanna ollmhóra sonraí ó shuirbhé ghearr-infridhearg den spéir a críochnaíodh le gairid. Trí chomparáid a dhéanamh le líon eile réaltaí sa réigiún leis an gcúlra seo bhí sé ar a gcumas roinnt scamall gáis agus dusta a fháil ar phlána Bhealach na Bó Finne chomh maith le líon mór réaltbhraislí nach raibh aon eolas orthu. Ag baint úsáide as sonraí i ndathanna difriúla d'fhéadfaí gnéithe bunúsacha an dusta sna scamail mhóilíneacha Réaltra aimsiú.

Tá níos mó fianaise faighte ag Roinn na Réaltfhisice, ag baint úsáide as sonraí ultraivilaite ó Spástheileascóp Hubble agus níos deireanaí fós ó Theileascóp Ollmhór (VLT) sa tSile, go rothlaíonn scairdeanna ó réaltaí óga. Fuarthas amach nach amháin go rothlaíonn príomhghné íonaithe na scairde ach go rothlaíonn an gás móilíneach ar an imeall freisin. Tugann an méid rothlaithe le fios gurb iad na scairdeanna an phríomhmheicníocht a bhaineann móiminteam



CosmoGrid Courses. Cúrsaí CosmoGrid



low for normal nuclear fusion to occur and instead they shine entirely through releasing gravitational energy. If such outflows were detected, it would imply that the jet mechanism is truly universal and occurs in a range of objects stretching from brown dwarfs to the massive black holes at the centres of active galactic nuclei.

The astronomy group studied the formation of so-called runaway stars through various processes including possible supernova explosion in binary systems. Such events will occasionally produce runaway stars with neutron star companions, which should be detectable with the upcoming GAIA astrometric satellite; the prediction is that about 35 such systems should be discovered. Work continued on various aspects of high-energy sources in galaxies and a bid, in conjunction with UCD, to organise an official International Astronomical Union symposium on this topic in 2005 in Dublin was successful.

A panel chaired by Prof Alan Green of ETH Zurich carried out the quinquennial review of the work of the School from 8-11 August.

uilleach ó réaltaí óga ag an staid a mbíonn na réaltaí le feiceáil ar a laghad. Tá an grúpa, ag baint leasa as breathnadóireachtaí a rinneadh leis an VLT, ag déanamh iarrachta an chéad fhianaise d'eisreabhadh ó abhaic dhonna nua-fhoirmithe a fháil. Is éard is abhaic dhonna ann ná "réaltaí nár éirigh leo"; tá a maiseanna ró-iseal chun go dtarlódh gnáthchomhleá núicléach agus ina áit sin lonraíonn siad trí fhuinneamh imtharraingteach a scaoileadh. Dá n-aimseofaí eisreabhadh den chineál sin thabharfadh sé le fios go bhfuil an mheicníocht scairde domhanda agus go dtarlaíonn sé i réimse nithe ó abhaic dhonna go dúphoill ollmhóra i lár núicléis réaltra ghníomhacha.

Rinne an grúpa réalteolaíochta staidéar ar fhormáid réalta éalaitheacha trí phróisis éagsúla lena n-áirítear pléascadh ollnóva a d'fhéadfadh tarlú i gcórais déréalta. Bíonn réaltaí éalaitheacha le neodrónréaltaí mar chomhlúadar acu mar thoradh ar imeachtaí mar sin agus ba chóir go mbeifí ábalta iad a aimsiú leis an tsaitilít réaltmhéadrach GAIA a bheidh ann go luath; is í an réamhaisnéis ná gur cheart go mbeadh suas le 35 córas den chineál sin le haimsiú. Leanadh den obair ar fhoinsí ard-fhuinnimh sna réaltra agus d'éirigh leis an iarracht, i gcomhar le UCD, siompóisiam oifigiúil de chuid An Cumann Idirnáisiúnta Réalteolaíochta a eagrú ar an ábhar seo i i mBaile Átha Cliath i 2005.

Rinne painéal faoi chathaoirleacht an Ollaimh Alan Green ó ETH Zurich athbhreithniú cúigbhliantúil ar obair na Scoile idir 8-11 Lúnasa.





Continuing on from the major changes seen during 2003, 2004 was a year of remarkable and unprecedented growth in the Geophysics Section of the School, in terms of both depth and breadth of activities. By the end of the year the Section saw overall staff and student numbers treble, and numbers involved in science multiply by a factor of five.

The year started with Alan Jones, the new Senior Professor and Head of Section, becoming full time at the Institute, and building what has become one of the largest and most diverse groups in the world using a natural-source electromagnetic method, called magnetotellurics (MT), for imaging the Earth's subsurface to depths in excess of 250 km. By the end of the year the MT group comprised five researchers, three post-graduate students, and one technician undertaking studies of computational forward and inverse problems, data processing methods for noise reduction, novel modelling and interpretational aspects, and with involvement on four major field campaigns.

The main project that took the MT group's attention was the Southern African Magnetotelluric Experiment (SAMTEX), which is a multi-year project undertaking studies in southern Africa in a consortium with other academic, government and industry partners from Ireland (DIAS), the U.S.A. (Woods Hole Oceanographic Institution), South Africa (Council for Geoscience, University of the Witwatersrand, DeBeers), Botswana (Geological Survey of Botswana, Rio Tinto) and Namibia (Geological Survey of Namibia). The primary focus of this project is to try to understand the tectonic processes that shaped the Earth we live on during the first half of its existence. This is being accomplished through mapping the geometries of the structures within the upper 250 km, particularly beneath the Archean (>2.5 billion year old) cratonic regions, which primarily are the source of diamonds, and the younger

Ag leanúint ó na hathruithe móra a tharla i 2003, tháinig méadú suntasach agus gan choinne ar Roinn Geoifisice na Scoile ó thaobh méide agus réimse gníomhaíochtaí. Faoi dheireadh na bliana bhí trí oiread foirne agus mac léinn sa Roinn agus tháinig méadú faoi chúig ar na huimhreacha a raibh baint acu le heolaíocht.

Ag tús na bliana fostaíodh go lánaimseartha san Institiúid Alan Jones, Ollamh nua agus Ceann na Roinne agus chuir seisean le chéile ceann de na grúpaí is mó agus is éagsúla sa domhan atá ag baint leasa as modh leitreamhaighnéadach foinse-nádúrtha darb ainm maighnéateallúiriach (MT) chun íomhá a dhéanamh ar fhodhromchla an Domhain chuig doimhne sa bhreis ar 250km. Faoi dheireadh an bliana bhí an grúpa MT comhdhéanta de cúig thaighdeoir, triúr mac léinn iarchéime agus teicneoir amháin atá ag tabhairt faoi staidéir ar fhadhbanna uimhríochta inbhéartacha agus chun cinn ar mhodhanna próiseála sonraí chun torann a laghdú, ar ghnéithe léiritheacha agus samhlaithe agus tá sé rannpháirteach i gceithre mhórfheachtas allamuigh.

Ba é an príomhthionscadal ar dhírigh an grúpa MT air ná Turgnamh Maighdnéateallúiriach Dheisceart na hAfraice (SAMTEX) agus is éard atá ann ná tionscadal ilbhliantúil atá ag déanamh staidéir i nDeisceart na hAfraice i gcomhar le páirtneirí acadúla, rialtais agus tionscail as Éirinn (DIAS), Stáit Aontaithe Mheiriceá (Institiúid Aigéaneolaíochta Woods Hole), Deisceart na hAfraice (An Chomhairle um Geolaíocht, Ollscoil Witwatersrand, DeBeers), Bostwana (Suirbhé Geolaíochta Bostwana, Rio Tinto) agus Naimbia (Suirbhé Geolaíochta Naimbia). Is é príomhfhócas an tionscadail ná tuisceint a fháil ar phróisis teicteonacha a mhúnlaigh an Domhan ó cruthaíodh é. Táthar á dhéanamh sin trí mhapáil a dhéanamh ar gheoiméadrachtaí na struchtúr laistigh den 250 km uachtarach go háirithe idir réigiúin

Figure 1



Figure 2



stitching mobile belts. In the Autumn of 2003 a 1350-km-long NE-SW profile of 75 MT stations, from the South African/Zimbabwe border to Sutherland near Cape Town, was acquired (red squares on figure). In Spring and Autumn 2004 MT data at a further 127 locations were acquired (dark green, light green, blue and yellow squares on the Figure 1).

During the year two training workshops were organized for SAMTEX consortium members. The first, held at DIAS in Merrion Square during March, was a two-week workshop on MT data processing, and three invited lecturers gave their approaches and demonstrated their codes. The second, held at the offices of DeBeers in Johannesburg in July, was a one-day workshop on MT data analysis. Preliminary results from the Autumn 2003 profile were presented at the GeoScience Africa meeting held at the University of the Witwatersrand in July.

The second major MT survey of the year was the ISLE-MT project, funded by the Irish Research Council for Science Engineering & Technology (IRCSET). ISLE-MT, or the MT component of the Irish Seismic Lithospheric Experiment (see Figure 2), involved acquiring MT data at each of the 22 ISLE sites across the Iapetus suture in southern Ireland. This geological body represents the closing of the Iapetus Ocean during the Ordovician time as a consequence of the collision between the Laurentian and Gondwanan plates. The Iapetus orogeny holds a prime place within the geological community, as it was in the Appalachians of Newfoundland that J. Tuzo Wilson first recognised what has become termed the Wilson-cycle of repeated ocean opening, ocean closing, and continent-continent collision.

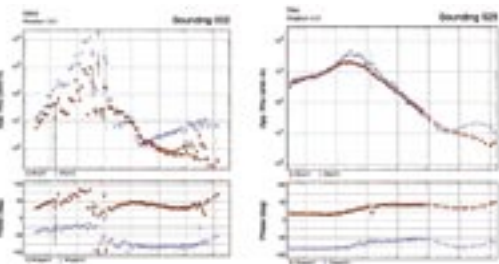
chratónacha Archean (>2.5 billiún bliain d'aois), na príomhfhoinsí diamaint, agus na críosanna gluaisteacha níos óige. I bhFómhar 2003 fuarthas próifíl 1350 km ar fad OT-ID de 75 stáisiún MT ó theorainn Dheisceart na hAfraice/Zimbabwe go Sutherland gar do Cape Town (cearnóga dearga ar an léaráid). In Earrach agus i bhFómhar 2004 fuarthas sonraí MT ag 127 áit bhreise (cearnóga uathne dorcha, uathne éadrom, gorm agus buí ar an léaráid).

Reachtáladh dhá cheardlann oiliúna do chomhaltaí Fheadhnacht SAMTEX. Ba cheardlann coicíse ar phróiseáil sonraí MT ab ea an chéad cheann a reachtáladh i DIAS ar Chearnóg Mhuirfean le linn mhí Márta agus thug tríúr léachtóirí eolas ar a gcur chuig féin agus léirigh siad a gcóid. Ceardlann aon-lae ar anailís ar shonraí MT ab ea an dara ceann a eagraíodh ag oifigí DeBeers i Johannesburg i mí Iúil. Cuireadh réamhthorthaí ó phróifíl Fhómhar 2003 i láthair ag cruinniú GeoScience Africa a reachtáladh in Ollscoil Witwatersrand i mí Iúil.

Ba é tionscadal ISLE-MT dara príomhshuirbhé MT na bliana a mhaoinigh Comhairle Taighde na hÉireann d'Innealltóireacht agus do Theicneolaíocht Eolaíochta (IRCSET). Is éard atá i gceist le ISLE-MT, gné MT den Turnngnamh Litisféarach Seismeach na hÉireann (féach Léaráid) ná sonraí MT a fháil ag gach ceann den 22 láthair ISLE thar an suture Iapetus i nDeisceart na hÉireann. Léiríonn an moll geolaíochta seo dúnadh Aigéan Iapetus in am Ordovician mar thoradh ar imbhualadh idir plátaí Laurentian agus Gondwanan. Tá tábhacht mhór le oraigineas Iapetus sa phobal geolaíochta mar gur sna Appalachia Thalamh an Éisc a d'aithnigh J. Tuzo Wilson don chéad uair timthriall-Wilson is é sin oscailt agus dúnadh leantach na haigéine agus imbhualadh ilchríoch-ilchríoch.



Figure 3



Already after a preliminary evaluation of the first recorded ISLE-MT data, it became obvious that the level of cultural noise is higher than anticipated. Particularly electric cow-fences disturb the high frequency data severely. Due to the high farming activity all over the country and the requirement to record close to the pre-existing seismic stations, this situation could not be changed during the data acquisition stage. An example of the acquired data can be seen above for two different sites of the array. The high frequency data at Site ISLE002 is clearly affected by cultural noise, whereas the long period data seem to be fairly clean. In contrast the recording at site ISLE025 shows clean data throughout the whole frequency range. It was decided that the postgraduate student would spend some time on this problem and develop signal-processing methods to deal with it.

The postdoctoral fellow, Dr. C.K. Rao of the Indian Institute of Geomagnetism based in Mumbai, India, has been processing the data with conventional methods and is currently analysing the long period data that are not affected by cultural noise. The postgraduate student, Mr. Max Moorkamp, is currently investigating methods to eliminate the influence of that noise. This includes recently developed new processing schemes as well as signal processing methods originally developed for other types of data such as seismic recordings.

Cheana féin i ndiaidh réamhmheastachán ar na chéad sonraí ISLE-MT a taifeadh ba léir go raibh an leibhéal den torann cultúrtha níos airde ná mar a bhíothas ag súil leis. Cuireann fála beithíoch leictreach ach go háirithe isteach go mór ar na sonraí ard-mhinicíochta. De bharr na gníomhaíochta ard feirmeoireachta a bheith ar fud na tíre agus an riachtanas taifead a dhéanamh gar do na stáisiúin seismeacha a bhí ann roimhe sin ní fhéadfaí aon athrú a dhéanamh ag céim thógáil na sonraí. Is féidir sampla de na sonraí a tógadh maidir le dhá láthair éagsúla den eagar a fheiceáil thíos. Is léir go bhfuil torann cultúrtha ag cur isteach ar shonraí ardmhinicíochta ag Láthair ISLE002 ach tá na sonraí fadthréimhseacha réasúnta glan air. Mar chomparáid léiríonn sonraí a taifeadh ag láthair ISLE025 go bhfuil siad glan thar an réimse minicíochta ar fad. Socraíodh go gcaithfeadh an mac léinn iarchéime roinnt ama ar an bhfadhb seo agus go bhforbródh sé modhanna próiseála comharthaíochta chun déileáil leis.

Tá an comhalta iardhochtúireachta an Dr. C.K. Rao ón Institiúid Gheomaighnéadas na hIndia atá lonnaithe i Mumbai san India ag próiseáil sonraí ag baint leasa as modhanna traidisiúnta agus faoi láthair tá sé ag déanamh anailíse ar shonraí fadthréimhseacha nach mbíonn aon tionchar ag torann cultúrtha orthu. Faoi láthair tá an mac léinn iarchéime an tUasal Max Moorkamp ag fiosrú modhanna chun deireadh a chur leis an tionchar a bheadh ag an torann sin. Áirítear orthu sin scéimeanna próiseála nua-fhorbartha chomh maith le modhanna próiseála comharthaí a forbraíodh ó thús do chineálacha eile sonraí mar taifid sheismeacha.

Ba i dtuaisceart Cheanada a bhí an tríú tionscadal allamuigh MT agus rinne Rialtas Northwest Territories maoiniú air. Is éard a bhí i gceist anseo ná tomhais MT a dhéanamh ar phróifíl oirthear-iarthar ó chratón Archean Slave go Cúige Bear. Rinneadh an t-implonú le



The third MT field project was in northern Canada and funded by the Northwest Territories Government. This involved making MT measurements on an east-west profile from the Archean Slave craton to the Bear Province on its west. Deployments were by float plane, and the crew was based in a fly-in geology camp in the centre of the craton. One of the main objectives of this project is to understand the nature of the Paleoproterozoic western boundary of the Slave craton in the Northwest Territories, Canada. The MT component was designed in an attempt to define the lithospheric-scale geometry of the transition between the Archean Slave craton and the Bear province. This research is a component of activities on Archean cratons to determine and understand the dominant tectonic processes during the early evolution of the Earth, particularly Archean lithosphere formation and deformation processes. The field component of this project took place in July of 2004 and was led by MT technician Jessica Spratt with assistance from technician Louise Collins and Scholar Anna Avdeeva. Broadband and long period MT data were collected at 21 stations along a 300km long northwest-southeast profile from the south-central Slave craton to the Bear Province crossing the Wopmay Orogen. Initial processing and preliminary models have been completed to date and reveal a mildly conductive upper mantle, without the presence of the Central Slave Mantle Conductor identified earlier by Jones, as well as localized conductive regions within the crust of the Slave.

Through Emmy Noether Fellow Ute Weckmann, the Section was involved in MT measurements as part of the German-South African Inkaba ye Afrika multi-disciplinary, geoscience project. MT data were collected at 82 sites along a 150km long profile with a site spacing of 2km between Prince Albert and Fraserburg crossing the Beattie Magnetic Anomaly (BMA) and the Southern Cape Conductive Belt (SCCB) in their entirety.

heitleán snámhain agus bhí an criú bunaithe i gcampa geolaíochta eitleite isteach i lár an chratóin. Ceann de phríomhchuspóirí an tionscadail seo is ea tuiscint a fháil ar theorainn iarthar Paleoproterozoic an chratóin Slave sna Críocha Thiar Thuaidh Ceanada. Leagadh amach an ghné MT mar iarracht geoiméadracht scála litisféireach den trasdul idir cratón Archean Slave agus Cúige Bear a shainmhíniú. Is gné é an taighde seo de na gníomhaíochtaí ar chratóin Archean chun tuiscint a fháil ar phróisis teicteonacha cheannasacha le linn luath-éabhlóid an domhain, go háirithe próisis fhoirmithe agus dhífhoirmithe litisféireacha Archean. Tharla gné allamuigh an tionscadail seo i mí Iúil 2004 agus ba í an teicneoir MT Jessica Spratt a bhí i gceannas air le cúnamh ón teicneoir Louise Collins agus Scoláire Anna Avdeeva. Bailíodh sonraí MT fadthréimhseach agus leathanbhanda ag 21 stáisiún ar phróifíl iarthuaisceart-oirdheisceart 300 km ar fad ó lárdeisceart chratóin Slave go Cúige Bear ag trasnú Wopmay Orogen. Tá na chéad-shamhaltacha próiseála agus réamhshamhaltacha tugtha chun críche go dáta agus léiríonn siad clúdach uachtarach mionseoltach gan an LárChlúdach Sclábhaí a d'aithin Jones níos luaithe chomh maith le réigiúin seoltacha logánta laistigh de sceamh an Sclábhaí.

Trí Emmy Noether Fellow Ute Weckmann, bhí an Roinn bainteach le tomhaisí MT mar chuid de thionscadal geolaíochta ildhisciplíneach na Gearmáine –Dheisceart na hAfraice Inkaba ye Afrika. Bailíodh sonraí MT ag 82 láthair thar próifíl 150 km ar fad le spásáil láithreach de 2km idir Prince Albert agus Fraserburg ag trasnú Beattie Magnetic Anomaly (BMA) agus Chrios Seoltach na Rinne ó Dheas (SCCB) ina n-iomláine.





Theoretical and computational aspects of electromagnetic data modelling and inversion, particularly three-dimensional inversion of MT data, were initiated with Senior CosmoGrid Fellow Dmitry Avdeev and Scholar Anna Avdeeva.

The seismology group within the Section focussed much of its effort on the HADES, or Hatton Deep Seismic, project. There are two main aspects to the HADES project, which is a part of the Irish National Seabed Survey and is funded by the Geological Survey of Ireland and the Irish Petroleum Infrastructure Programme. The first is to resolve in detail the structure of the Hatton Continent-Ocean boundary and axial structure of the Hatton Basin using wide-angle seismic methods, and the second is aimed at an improved understanding of the development of the whole region by integration of the results of this and previous wide-angle seismic data with other geophysical and geological data. Seismic data were recorded by 300 ocean bottom seismometers (OBS) along three profiles with a total of distance of over 1000 km. The data were processed, formatted and first arrivals were interpreted during 2004. The close OBS and shot spacing (3 km and 120 m respectively) resulted in a huge quantity of excellent quality data. The main features of the upper crustal model are two topographic highs separating sedimentary basins with sediment velocities of 2.5 - 3.5 km/s. The model also resolves four high velocity (7.2 to 7.3 km/s) regions in the crust probably related to Cenozoic magmatic underplating along the Hatton Continental Margin.

Data acquisition from the ISLE network (Ireland Seismic Lithospheric Experiment, see map above), funded by an Enterprise Ireland Basic Research Grant, continued throughout 2004 and is planned to continue into 2005 to obtain more good events from directions at a higher angle to the Iapetus Suture Zone. Analysis of controlled

Tionscnaíodh gnéithe uimhríochta agus teoriciúla de shamhlacha sonraí leictreamaighnéadacha agus inbhéartaithe, go háirithe inbhéartú tríthoiseach de shonraí MT, i dteannta Chomhalta Sinsearach de chuid CosmoGrid, Dmitry Avdeev agus Scoláire Anna Avdeeva.

Dhírigh an grúpa seismeolaíochta laistigh den Roinn go leor dá chuid iarrachtaí ar thionscadal HADES nó tionscadal Hatton Deep Seismic. Tá dhá phríomhghné ag baint leis an tionscadal HADES atá mar chuid de Shuirbhé Náisiúnta Ghrinnill na hÉireann agus a bhfuil Suirbhé Geolaíochta na hÉireann agus Clár Infrastruchtúir Peitríliam na hÉireann á mhaoiniú. An chéad ghné ná réiteach mionsonraithe a fháil ar struchtúr teorainn Aigéan-Ilchríoch Hatton agus ar struchtúr aiseach Imchuach Hatton ag baint úsáide as modhanna seismeacha leathanuilleacha agus dara gné an tionscadail ná díriú ar chur leis an tuiscint ar fhorbairt an réigiúin iomláin tríd na torthaí seo agus sonraí seismeacha leathanuilleacha roimhe seo a lánpháirtiú le sonraí geolaíocha agus geoifisice eile. Thairfead 300 seisiméadar grinnill (OBS) sonraí seismeacha thar thrí phróifíl thar 1000 km ar an iomlán. Próiseáladh agus leagadh amach na sonraí agus míníodh na chéad torthaí le linn 2004. Fuarthas sonraí ardcháilíochta go leor as OBS dlúth agus spásáil seat (3cm agus 120cm faoi seach). Is iad príomhghnéithe an mhúnla screimhe uachtaraigh ná dhá ard thopaighrafacha ag ronnt imchuacha dríodair le luais dríodair de 2.5-3.5 cm/s. Réitíonn an múnla freisin ceithre réigiún ardluais sa screamh gaolmhar is dócha le fophláitú maighnéadach Cenozoic feadh Imeall Ilchríche Hatton.

Leanadh le sonraí a fháil ó líonra ISLE (Turgnamh Litisféarach Seismeach na hÉireann, féach léarscáil thuas) a ndearna Deontas Taighde Bunúsach de chuid Enterprise Ireland maoiniú air le linn 2004 agus tá sé beartaithe leanúint leis amach i 2005 chun tuilleadh





Geophysics Group. An Grúpa Geofisice.

source S-wave data acquired during the VARNET experiment was started in order to investigate crustal anisotropy and its contribution to the total anisotropy observed in the ISLE teleseismic data.

During 2004 some consideration was given to upgrading DNET, or DIAS seismology network, to make it a truly Irish National Seismic Network recording modern data with real-time transmission to DIAS. The current DNET stations are showing their age. The broadband digital seismic station DSB of the German GEOFON international seismic network continued to record efficiently and the waveform data of the SE Asian earthquake and tsunami from this station (the largest event recorded this year) was available on the INTERNET twenty minutes after the data had been recorded. This event generated a very large public and media interest.

Finally, the Section initiated a new activity during 2004, namely rheological modelling through a CosmoGrid researcher, Dr. Tadashi Yamasaki, and a School scholar, John Sheehan. It is planned to implement and develop modelling codes and carry out numerical experiments on the complex coupled thermal and rheological processes that lead to the formation of large-scale Earth structures. The initial research target will be Mesozoic basin and continental margins development in the North Atlantic and the role of magmatism and strain rate in forging basin geometries and lithospheric structure.

imeachtaí maithe a fháil ó threoracha ag uilleann níos airde go Zón Suture lapetus. Cuireadh tús le hanailís ar shonraí S-wave foinse rialaithe a fuarthas le linn thurgnamh VARNET chun ainistróife screimhe a fhiosrú agus conas mar a chuireann sé le ainistróife iomlán a haithníodh sna sonraí teileseismeacha ISLE.

Le linn 2004 breithníodh ar cheart DNET, nó líonra seismeolaíochta DIAS a uasghrádú chun Líonra Náisiúnta Seismeach na hÉireann a dhéanamh de a dhéanfadh taifead ar shonraí comhaimseartha agus a bheadh á dtarchur i réadam go DIAS. Tá na stáisiúin DNET reatha ag dul in aois anois. Lean an stáisiún seismeach DSC digiteach leathanbhanda de chuid líonra seismeach idirnáisiúnta GEOFON na Gearmáine ag déanamh taifeadadh éifeachtach agus bhí sonraí ar thonnchruth an na crithtalún san Áis agus an tsunami ón stáisiún (an imeacht ba mhó a taifeadadh i mbliana) le fáil ar an IDIRLÍON fiche nóiméad i ndiaidh na sonraí a thaifeadadh. Chuir an pobal agus na meáin suim mhór san eachtra seo.

Ar deireadh, chuir an Roinn tús le gníomhaíocht nua le linn 2004 is é sin samhaltú rheolaíochta faoi stiúir taighdeoir de chuid CosmoGrid, an Dr. Tadashi Yamasaki agus Scoláire na Scoile, John Sheehan. Tá sé beartaithe cód samhaltaithe a fhorbairt agus a fheidhmiú agus turgnaimh uimhríochta a dhéanamh ar phróisis rheolaíochta a mbíonn foirmiú struchtúir mhóra an Domhain mar thoradh orthu. Is í an chéadsprioc taighde ná imchuach Mesozoic agus forbairt na n-imeall ilchríochach san Atlantach Thuaidh agus ról magmatacht agus ráta staidhne chun geoiméadrachtaí imchuaiche agus struchtúir litisféaracha a chruthú.

# School of Theoretical Physics/ Scoil na Fisice Teoiriciúla

This year saw much activity in the School. We were fortunate to have a 6-month visitor for the second part of this reporting period. A further expansion of our visitor programme, especially with longer-term visitors would be very beneficial to both the research efforts and the visibility of the School. A review of the work of the School was carried out in November by a panel of international experts. To quote from their report: "The School of Theoretical Physics of the Dublin Institute for Advanced Studies is a jewel within Ireland. Although it is a relatively small institution, the School plays an important role in focusing on science in Ireland and linking it with leading science in the rest of the world."

The main developments during the year were:

## Personnel

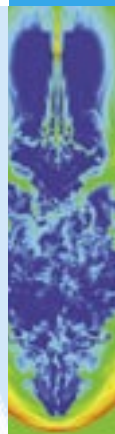
- A pre-doctoral Scholar, Sean Murray started work under supervision of Dr. Brian Dolan and Prof. Denjoe O'Connor, funded by an Enterprise Ireland Research Grant.
- A new post-doctoral Scholar, Dr. Marianne Leitner joined the School in August.
- At the beginning of October, an Embark Initiative Postdoctoral Fellow, Dr. Seçkin Kürkçüoğlu started work with Prof. O'Connor on supersymmetric fuzzy models.
- Three post-doctoral Scholars left the School and took up positions elsewhere: Dr. Xavier Martin at the end of September, Dr. Jean-Bernard Bru at the end of October, and Dr. Badis Ydri at the end of the year.
- One pre-doctoral Scholar, Ms. Julietta Medina, left the School at the end of the year.

Tharla go leor gníomhaíochta sa Scoil i mbliana. Bhí an t-ádh orainn go raibh cuairteoir againn a d'fhan sé mhí don dara cuid den tréimhse a bhfuiltear ag tuairisciú fúithi. Rachadh sé chun tairbhe d'iarrachtaí taighde chomh maith le cur le hinfheictheacht na Scoile dá leathnófaí ár gclár cuairteoirí, go háirithe maidir le cuairteoirí fad-tréimhseacha. Rinne painéal saineolaithe idirnáisiúnta athbhreithniú ar obair na Scoile i mí na Samhna. Seo sliocht as a dtuarascáil: "Is seoid de chuid na hÉireann í Scoil na Fisice Teoiriciúla Institiúid Ard-Léinn na hÉireann. Cé gur institiúid sách beag í tá ról tábhachtach ag an Scoil maidir le díriú ar eolaíocht in Éirinn agus í a nascadh le heolaíocht ar fud an domhain"

Ba iad na príomhfhorbairtí le linn na bliana ná:

## Pearsanra

- Chuir scoláire réamh-Dhochtúireachta, Seán Murray, tús le hobair faoi mhaoirseacht an Dr Brian Dolan agus an Ollaimh Denjoe O'Connor, le maoiniú ó Dheontas Taighde Enterprise Ireland.
- Tháinig Scoláire iar-dhochtúireachta nua, an Dr. Marianne Leitner ag obair sa Scoil i mí Lúnasa.
- Ag tús Dheireadh Fómhair thosaigh Comhalta Iardhochtúireachta Thionscnamh Embark, an Dr. Seçkin Kürkçüoğlu ag obair leis an Ollamh O'Connor ar shamhaltacha doiléire ollsiméadracha.
- D'imigh triúr Scoláire Iar-Dhochtúireachta ón Scoil agus ghlac siad le postanna in áiteanna eile: An Dr. Xavier Martin ag deireadh Mheán Fómhair, an Dr. Jean-Bernard Bru ag deireadh Dheireadh Fómhair, agus an Dr. Badis Ydri ag deireadh na bliana.
- D'imigh Scoláire Réamh-Dhochtúireachta amháin, Julietta Medina Uasal, ón Scoil ag deireadh na bliana.



## Organisational Activities and Achievements

- Four meetings were organised: an international workshop on Noncommutative Geometry, the Fourth International Workshop on Mathematical Analysis of Quantum Systems, and the DIAS Winter Symposium, the latter in collaboration with the Irish Mathematical Society, and a workshop on Causal Sets.
- An External Review of the work of the School was carried out by a panel of experts, comprising Prof. A. Jaffe (Harvard, chair), Prof. J. Cardy (Oxford), Prof. R. Dijkgraaf (Amsterdam) and Prof. D. Simms (Trinity College). As part of their main recommendations they stress:
  1. The importance of appointing a high-profile and proactive Chair of the Board following the anticipated retirement of Sir Michael Atiyah.
  2. The importance of capitalising on the recent momentum within the School, by increasing the number of Senior Professors at least by two, preferably by three, with a proportionate increase in the number of Post-Doctoral Fellows.
  3. The importance of unifying the three Schools around a new, central location on Fenian Street.

## Research Activities

### Statistical Mechanics and Disordered Systems

A review article was written with Dr. N. Datta (Cambridge) about quantum source coding, outlining a few of the most important results in the area. One can distinguish two kinds of source coding: noiseless coding and noisy coding. (There is also an entirely separate type of coding, namely secret coding or encryption, which we do not consider.) The review concentrated on noiseless coding and will appear in the Encyclopaedia of Mathematical Physics.

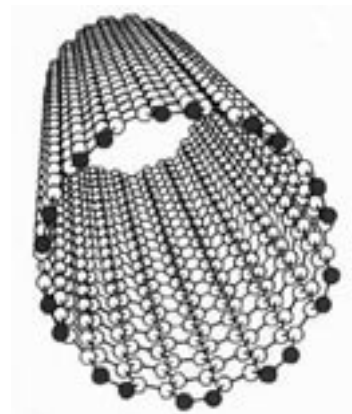
## Gníomhaíochtaí Eagraíochtúla agus Nithe a Baineadh Amach

- Reachtáladh ceithre chruinniú: ceardlann idirnáisiúnta ar Chéimseata Neamhinmhalartaithe, an Ceathrú Ceardlann Idirnáisiúnta ar Anailís Mhatamaitice ar Chórais Chandamacha, agus Simpóisiam Gheimhridh DIAS a eagraíodh i gcomhar le Cumann Matamaitice na hÉireann agus ceardlann ar Ghnáthsheiteanna.
- Rinne painéal saineolaithe a bhí comhdhéanta den Ollamh A. Jaffe (Harvard, Cathaoirleach), an tOllamh. J. Cardy (Oxford), An tOllamh. R. Dijkgraaf (Amsterdam) agus an tOllamh Prof. D. Simms (Coláiste na Tríonóide) athbhreithniú seachtarach ar obair na Scoile. Mar chuid dá bpríomhmholtaí leag siad béim orthu seo a leanas:
  1. An tábhacht atá le Cathaoirleach a cheapadh ar an mBord a mbeadh próifíl ard aige/aici agus a bheadh gníomhach tar éis don Uasal Michael Atiyah éirí as an bpost sin.
  2. An tábhacht atá le cur le móiminteam reatha na Scoile agus líon na nOllamh Sinsearach a ardú agus ar a laghad beirt eile nó triúr eile a cheapadh agus ardú a chur ar líon na gComhaltaí Iar-Dhochtúireachta dá réir.
  3. An tábhacht atá leis na trí Scoil a thabhairt le chéile ag suíomh nua lárnach ar Shráid na bhFinníní.

## Gníomhaíochtaí Taighde

### Meicníochtaí Staitistiúla agus Córais Neamhordúla

Scríobh an Dr. N. Datta (Cambridge) alt athbhreithnithe ar chódú foinsí candamacha, agus leag sí amach ann na torthaí is tábhachtaí sa réimse sin. Tá dhá chineál



In collaboration with W. Skrypnik (Kiev), a number of quantum spin systems were studied which have the property that their ground state can be described as a Gibbs state of a classical spin system. The simple structure of these ground states allowed us to conclude that these models have two independent order parameters with attendant long-range order.

During a visit of the Joint Institute for Nuclear Research in Dubna (Russia) a new project was started in collaboration with V. B. Priezzhev concerning the exact solution of the asymmetric exclusion process on a ring. Rapid progress was made in analysing the normalisation of the total probability, which led to new insights into the Bethe Ansatz equations for this model. The result was published in an electronic journal.

The collaboration with Prof. J. V. Pulé (UCD) on Anderson localisation in one-dimensional systems has been making steady progress and will be continued into 2005. The principal aim at this stage is to understand the high conductivity of carbon nanotubes. These are single macromolecules of carbon in the form of a roll of chicken wire (see figure). As they are essentially one-dimensional, one would expect that they are poor conductors of electricity in the presence of small amounts of disorder. Experimentally, this turns out not to be the case. It was suggested by White and Todorov that this could be explained as a result of an averaging of the disorder over the circumference of the nanotube. We aim to substantiate their claim with a more accurate mathematical analysis.

códú foinsí ann: códú neamhghlórach agus códú glórach. (Tá codú de chineál eile ar leithligh ann darb ainm códú rúnda nó inscriptiúchán ach ní bhreithnímid na cinn sin.). Dhírigh an t-athbhreithniú ar chódú neamhghlórach agus beidh sé sa Encyclopaedia of Mathematical Physics.

I gcomhar le W.Skrypnik (Kiev), rinneadh staidéar ar roinnt córas guairneach candamach a bhfuil sé ag baint leo gur féidir cur síos a dhéanamh ar a staid talún mar staid Gibbs de chóras guairneach clasaiceach. Chuir struchtúr simplí na staideanna talún ar ár gcumas a theacht ar an gconclúid go bhfuil dhá pharaiméadar oird neamhspleách ag na samhaltacha seo le ord fad-réimse freastalaithe.

Le linn do Chomh-Institiúid um Thaighde Núicleach i Dubna (An Rúis) a bheith ar cuairt cuireadh tús le tionscadal nua i gcomhar le V. B. Priezzhev maidir le réiteach cruinn na samhla seo ar fháinne. Rinneadh dul chun cinn tapa maidir le hanailís ar normalacht na dochúlachta iomláine agus mar thoradh air sin fuarthas léargais nua ar chothromóidí Bethe Ansatz don tsamhail seo. Foilsíodh an toradh in iris leictreonach.

Táthar ag déanamh dul chun cinn leanúnach san obair i gcomhar leis an Ollamh J. V. Pulé (UCD) ar logánú Anderson i gcórais aon-toiseacha agus leanfar leis sin amach i 2005. Is í an phríomhaidhm ag an bpointe seo ná tuiscint a fháil ar an seoltacht ard a bhaineann le nanafheadáin charbóin. Is éard iad sin ná macra-mhóilíní aonair de charbóin i bhfoirm ról sreang mhiotail (féach Léaráid). Mar go bhfuil siad aon-toiseach bheifí ag súil nach seoltóirí maithe leictreachais iad agus méideanna beaga neamhoird i láthair. I ndiaidh trialacha a dhéanamh ní hionann an scéal. Dar le White agus Todorov d'fhéadfaí sin a mhíniú mar an toradh ar mheánú an neamhoird thar imlíne an nanafheadáin. Tá sé beartaithe againne tacú lena bhfuil ráite acu le hanailís mhatamaitice níos cruinne.





## Field Theory and Particle Physics

The group associated with Professor Nahm worked on the link between integrable quantum field theories and conformally invariant theories. An integrable model on a circle of circumference  $L$  yields a conformally invariant theory in the limit  $L \rightarrow 0$ , and a theory with an exactly known  $S$ -matrix in the limit  $L \rightarrow \infty$ . The latter can be described by the Bethe Ansatz, but it was found that the same technique also applies in the small- $L$  limit. A full understanding of the finite- $L$  domain is still lacking, but a partial understanding in special cases has been obtained. The link between the Bethe Ansatz and quantum groups has been extended to the case of  $SO(8)$ , where a Yangian description is essential.

Two new results were also obtained in the analysis of the cohomology of vector bundles. A conjecture about a necessary condition for the vanishing of the cohomology group was proved in all generality. A second result concerns the cohomology of products of exterior powers of vector bundles.

The group associated with Professor O'Connor continued its investigations of fuzzy spaces and their use for the non-perturbative study of field theories. The focus in this reporting period shifted to developing techniques for supersymmetric models. It is remarkable that these spaces permit the truncation of supersymmetric theories to ones with a finite number of degrees of freedom while preserving the supersymmetry. Progress was made in the understanding of non-supersymmetric models also. The phase diagram of the simplest scalar model was mapped out and contact was made with random matrix theory. The motivation for the study of fuzzy field theory is diverse, but one principal goal is to develop an alternative method for dealing with the non-perturbative aspects of quantum field theory and

## Réimsetheoiric agus Fisic Chaithníne

Bhí an grúpa a bhaineann leis an Ollamh Nahm ag obair ar an nasc idir réimsetheoiricí candamacha insuimeálaithe agus teoiricí do-athraitheacha comhfhoirmiúla. Tugann samhail insuimeálaithe ar chiorcal imlíne  $L$  teoiric athraitheach chomhfhoirmitheach sa teorainn  $L \rightarrow 0$ , agus teoiric  $S$ -maitrís ar eol gur cruinn í sa teorainn  $L \rightarrow \infty$ . Is féidir leis an Bethe Ansatz cur síos ar an gceann deiridh ach fuarthas amach go mbaineann an teicníc chéanna leis an teorainn beag- $L$ . Níl tuiscint iomlán fós ar an bhfearainn fhinideach- $L$  ach táthar tagtha ar leaththuiscint i gcásanna speisialta. Tá síneadh curtha leis an nasc idir Bethe Ansatz agus grúpaí candamacha go cas  $SO(8)$  mar go bhfuil cuntas Yang riachtanach.

Thángthas ar dhá thoradh nua san anailís ar cohameolaíocht na mbeart veicteora. Cruthaíodh ceapadh faoi choinníoll riachtanach d'imeacht an ghrúpa cohameolaíochta i ngach ginearálacht. Baineann an dara toradh le cohameolaíocht táirgí cumhachtaí seachtracha na mbeart veicteora.

Lean an grúpa faoin Ollamh O'Connor lena fhiosrúcháin maidir le spásanna doiléire agus an úsáid atá le baint astu do staidéar neamhchorraíola na réimsetheoiricí. D'athraigh an bhéim sa tréimhse tuairiscithe seo go teicnící a fhorbairt do shamhaltacha ollsiméadracha. Is suntasach an rud é go gceadaíonn na spásanna seo teascadh na dteoiricí ollsiméadracha go cinn lena mbaineann finéadach céimeanna saoirse agus fós go gcaomhnaítear an ollsiméadracht. Rinneadh dul chun cinn maidir le tuiscint a fháil ar shamhaltacha neamh-ollsiméadracha freisin. Leagadh amach léaráid chéimithe de tsamhail scála is simplí agus rinneadh ceangal leis an teoiric maitrise randamach. Tá éagsúlacht ag baint leis an spreagadh atá laistiar den staidéar ar réimsetheoiric doiléire agus is é an





hence provide an alternative to lattice approximations. They provide methods of studying the renormalizability properties of the non-commutative field theories that have received much attention in recent years. Moreover, fuzzy spaces (and more general non-commutative spaces) also appear to be of fundamental importance in string theory.

Progress has been steady in studies of lattice gauge theories, where numerical lattice techniques are used to test the range of length scales where the predictions of an effective string picture for confinement is expected to hold.

Further progress was made in the study of quantal random walks. A suitable family of Markovian quantal processes was found based on nearest neighbour transitions. It is still an open question whether a subset of these processes has a unitary evolution as limit.

A detailed study was made of the one and two loop approximations for spin systems with a view to obtaining a universal equation of state for such systems.

A novel parameterization arises naturally from a crossover renormalization group. The resulting function captures many universal amplitudes of the system and gives excellent agreement with other methods and known results.

#### Astrophysics and Maya Research

Professor Nahm continued his interest in historical supernovae. Investigations of supernova remnants are much better constrained when the age of the remnant is known. Thus historical supernova observations are of great astrophysical interest. The observations at 1006, 1054 and 1181 AD are known from various regions, but for earlier supernovae only the Chinese report from 393 AD seemed trustworthy. Another Chinese

príomhspríoc ná modh malartach a fhorbairt chun déileáil le gnéithe neamhchorraíola de réimsetheoiric candamach agus dá bhrí sin bheadh malairt ar fáil do neasacháin laitíse. Soláthraíonn siad freisin bealaí chun staidéar a dhéanamh ar airíonna athnormalachta na réimsetheoirice neamhinmhalartaithe a bhfuil go leor airde tugtha orthu le blianta beaga anuas. Rud eile de shílfí go bhfuil tábhacht bhunúsach le spásanna doiléire (agus spásanna neamhinmhalartaithe) i sreangtheoiric.

Rinneadh dul chun cinn cothrom i staidéar ar theoiricí tomhas laitíse le leas bainte as teicnící laitíse uimhriúla chun tástáil a dhéanamh ar raon na scálaí achair sa chás go measfar go seasfaidh réamhaisnéisí faoi shreagphictiúir éifeachtacha.

Rinneadh dul chun cinn cothrom maidir le staidéar ar shiúlóidí fánacha candamacha. Fuarthas teaghlach próisis candamach Markov oiriúnach bunaithe ar thrasdul na comharsana is gaire. Níltear cinnte fós an dteoranaíonn fothacar de na próisis seo chuig éabhlóid aonadach.

Rinneadh mionstaidéar ar an neastachán lúibe a haon agus a dó do chórais ghuairneacha le súil cothromóid uilíoch de staid dá leithéid a fháil.

Tagann paraiméadracht chun cinn go nádúrtha ó ghrúpa normalachta trasach. Cuisíonn an fheidhm a fhaightear go leor aimplitimíd Uilíocha den chóras agus tugann torthaí an-mhaithe a thagann le torthaí atá ann agus le modhanna eile a bhfuil torthaí le fáil ina leith.

#### Réaltfhisic agus Taighde Maya

Lean an tOllamh Nahm leis an tsuim atá aige in ollnóva stairiúil. Táthar ábalta fiosrúcháin maidir le iarsmaí ollnóva a chúngú i bhfad níos fearr nuair a bhíonn aois an iarsma ar eolas. Mar sin tá suim mhór réaltfhisice i mbreathnadóireachtaí ollnóva stairiúil.

report from 185 AD had been explained away as a confusion of a nova and a comet. The study of Maya inscriptions of Tikal yielded a strong link of the 393 AD supernova in Scorpio with the birth of a king. On Stela 1 this king is shown in an astronomical context, at the location of the supernova. The Hauberg Stela from 197 AD is the only one with a similar iconography and highlights the position of the 185 AD event. This confirms the Chinese report and fixes the age of the controversial remnant RCW86. In addition, the Hauberg Stela emphasizes Scorpio. This may well be due to the previous observation of a supernova very close to the 393 AD event. Indeed, the close neighbours G348.5+0.1 and G348.7+0.3 are both young remnants and strong candidates for historical supernovae.

Tá eolas ann maidir le breathnadóireachtaí ó 1006, 1054 agus 1181 AD ó réigiúin éagsúla ach is iad na Síne amháin a thugann tuairisc ar aon ollnóva níos túisce ná sin ag 185AD gur fiú brath orthu. Míníodh breathnadóireacht eile de chuid na Síne ó 185 AD mar mheascán de nóva agus de choiméad. Léirigh staidéar ar inscríbhinní Maya ar Tikal nasc láidir idir ollnóva 393 AD i Scairp le breith rí. I Stela 1 léirítear an rí seo i gcomhthéacs réalteolaíochta, ag suíomh an ollnóva. Is é Stela Hauberg ó 197 AD an t-aon cheann a bhfuil íocónagrafaíocht cosúla ag baint leis agus léiríonn sé suíomh imeacht 185 AD. Deimhníonn sé seo tuairisc na Síne agus cuireann sé aois ar an iarsma conspóideach RCW 86. Chomh maith leis sin cuireann Stela Hauberg béim ar Scairp. Gach seans gur mar gheall ar an mbreathnadóireacht roimhe sin d'ollnóva an-ghar d'imeacht 393AD é seo. Go deimhin féin is iarsmaí óga iad G348.5+0.1 agus G348.7+0.3, atá an-ghar dá chéile, agus tá seans láidir ann go ndéanfaidh siad ollnóvanna stairiúla.



Noncommutative Geometry Network Meeting November 2004.  
*Cruinniú Llonra Chéimseata Neamhinmhalartaithe Samhain 2004.*

# Administration and Finance/ Riarachán agus Airgeadas

The administration staff of the Institute provide clerical, financial and other support services to the Council of the Institute, the three schools and their associated committees.

Significant progress was made on implementing the agreed Sustaining Progress Modernisation Action Plan. The following initiatives were progressed by working groups operating under the Partnership Forum:

## PMDS

Planning commenced on devising a system of Performance Management & Development System for members of the non-academic staff and a framework for its introduction was agreed.

## Customer Service

A customer charter was prepared for adoption by Council. As part of this process, an online survey of a representative sample of the Institute's external customers was undertaken. However, the response rate to the questionnaire was very low and did not generate any significant level of feedback. The development of standards was ultimately guided by feedback gained from canvassing the views of staff working in the different functional areas.

A customer satisfaction survey was also undertaken of customers in the Publications Sales and HR sections of central administration. Both surveys, one involving external customers and the other an internal staff survey, revealed a high degree of satisfaction with the nature and quality of the service provided. The survey of HR users in particular elicited very useful feedback on how the HR function could be developed.

Soláthraíonn foireann riaracháin na hInstitiúide seirbhísí cléireachais, airgeadais agus seirbhísí tacaíochta eile chuig Comhairle na hInstitiúide, na trí scoil agus a gcoistí bainteacha.

Rinneadh dul chun cinn suntasach maidir leis an bPlean Gnímh Nuachóirithe Ag Coinneáil an Dul Chun Cinn a fheidhmiú. Chuir grúpaí a bhí ag feidhmiú faoin bhFóram Compháirtíochta na tionscnaimh seo a leanas chun cinn:

## CBFF

Cuireadh tús le Córas Bainistíochta agus Forbartha Feidhmíochta a ceapadh do chomhaltaí foirne neamhacadúla agus comhaontaíodh ar chreat oibre chun é seo a thabhairt isteach.

## Seirbhísí Custaiméirí

Ullmhaíodh cairt chustaiméirí a bhí le glacadh ag an gComhairle. Mar chuid den phróiseas seo tugadh faoi shuirbhé ar-líne ar shampla ionadaíoch de chustaiméirí seachtracha na hInstitiúide. Bhí ráta freagartha ar an gceistiúchán an-íseal áfach agus ní bhfuarthas leibhéal aiseolais suntasach ar ais. Ar deireadh forbraíodh caighdeán ag baint leasa as aiseolas a fuarthas ó thuairimí na foirne a bhí ag obair i réimsí feidhmíochta éagsúla.

Tugadh faoi shuirbhé sástachta custaiméirí freisin ar chustaiméirí i ranna Díolacháin Foilseachán agus Acmhainní Daonna den lár-riarachán. Léirigh an dá shuirbhé, ceann a raibh baint ag custaiméirí seachtracha leis agus an ceann eile suirbhé foirne inmheánach, go raibh leibhéal ard sástachta ann i leith cineál na seirbhíse a sholáthraítear agus an caighdeán a bhaineann léi. Fuarthas aiseolas an-úsáideach ar an suirbhé Acmhainní Daonna maidir le conas feidhm Acmhainní Daonna a fhorbairt.

## Partnership

A review of the work and functions of the Institute's Partnership Forum was undertaken in January 2004 by an external consultant. In general it was found that partnership was making a positive impact on the working environment. Some constructive proposals emerged on extending and further embedding partnership. Council's acceptance of a proposal to provide for staff representation at meetings of the Council represents a major step forward in this direction.

During the year, three independent panels were appointed to review the research work of the Institute's constituent schools. A separate panel was appointed for each School consisting of four/five leading experts in the School's area of research. The Report from each Panel was adopted by the respective Governing Board and by Council. The Registrar's Office was involved in organising and co-ordinating the arrangements for the review and also provided secretarial assistance to the three panels.

## Finance

The attached financial statements report a deficit of €56,061 for the year.

This compares with a deficit of €62,569 in the year to 31st December 2003.

Total income for the Institute increased from €6,618,741 in 2003 to €9,024,609 for 2004. This represents an improvement of €2,405,868 or 36.35 % and the main increases arose in Oireachtas income and projects. The respective increases were €503,209 and €1,918,012.

The Institute's total costs, after adjusting for the transfer to the capital reserve, also increased from €6,681,310 in 2003 to €9,080,670 in 2004 i.e. an increase of €2,399,360 or 35.91%.

## Comhpháirtíocht

Thug comhairleoir seachtrach faoi athbhreithniú ar obair agus ar fheidhmeanna Fóram Comhpháirtíochta na hInstitiúide in Eanáir 2004. Go ginearálta fuarthas amach go raibh tionchar dearfach ag an gcomhpháirtíocht ar an timpeallacht oibre. Tháinig roinnt moltaí úsáideacha chun cinn maidir le comhpháirtíocht a shíneadh agus a neartú tuilleadh. Is céim mhór sa treo seo é gur ghlac an Chomhairle leis an moladh go mbeadh ionadaíocht ag an bhfoireann ag cruinnithe na Comhairle.

Le linn na bliana ceapadh trí phainéal neamhspleách chun athbhreithniú a dhéanamh ar obair thaighde chomh-scoileanna na hInstitiúide. Ceapadh painéal ar leithligh do gach scoil ar a raibh ceathrar/cúigear saineolaithe ceannrórdaíocha i réimse taighde na Scoile sin. Ghlac Bord Rialaithe agus Comhairle gach scoil le Tuarascáil gach painéal. Bhí baint ag Oifig an Chláraitheora le socruithe a eagrú agus le comhordú don athbhreithniú agus chuir an oifig cúnamh rúnaíochta ar fáil don trí phainéal.

## Airgeadas

Tuairiscíonn na ráitis airgeadais atá faoi iamh easnamh de €56,061 don bhliain.

Sin i gcomparáid le barrachas de €62,569 sa bhliain go dtí 31ú Nollaig 2003.

Tháinig ardú ar ioncam iomlán na hInstitiúide ó €6,618,741 i 2003 go dtí €9,024,609 do 2004.

Léiríonn sé sin feabhas de €2,405,868 nó 36.35 % agus tharla na príomharduithe in ioncam Oireachtas agus tionscadail. Ba iad na harduithe faoi seach ná €503,209 agus €1,918,012.

Tháinig ardú ar chostais iomlána na hInstitiúide freisin, tar éis coigeartú don aistriú chuig an gcúlchiste caipitil ó €6,681,310 i 2003 go dtí €9,080,670 i 2004 i.e. ardú de €2,399,360 nó 35.91%.



The significant movements in costs took place in payroll, projects and general expenses where the respective increases of €587,902, €1,928,133, and €45,422 arose.

During the year the Institute continued its investment program in its facilities and premises maintenance.

Investment in facilities included the upgrade of backup storage, replacement of file servers and the purchase of additional clusters in the School of Theoretical Physics.

Tharla na gluaiseachtaí suntasacha i gcostais i bpárolla, tionscadail, agus costais ghinearálta áit ar tharla na harduithe faoi seach de €587,902, €1,928,133 agus €45,422 chun cinn.

Le linn na bliana lean an Institiúid lena clár infheistíochta maidir le cothabháil ar a cuid saoráidí agus áitreabh.

Bhí uasghrádú ar stóras cúltaca, athchur freastalaithe comhad san áireamh in infheistíocht i saoráidí agus ceannaíodh braislí breise i Scoil na Fisice Teoiriciúla.



# Institute Staff

## Council of the Institute

### Chairman

D. Donnelly

### Ex-Officio Members

Dr. H. Brady, President, UCD  
(from 1 January)

Dr. M. Ryan, President, RIA

Dr J. Hegarty, Provost, TCD

### Members Appointed by the Governing Boards of Constituent Schools

M. Atiyah

G. Wrixon

B. Ó Madagáin

T. C. Dorlas

L. Drury

F. Kelly

## Governing Board of the School of Celtic Studies

### Chairman

B. Ó Madagáin

### Senior Professors

L. Breatnach

F. Kelly

M. Ó Murchú

### Appointed Members

M. Ní Neachtain

D. Ó Baoill

M. Herbert

R. Ó hUigínn

## Governing Board of the School of Theoretical Physics

### Chairman

M. Atiyah

### Senior Professors

T.C. Dorlas

D. O'Connor

W. Nahm

### Appointed Members

A.C. Breslin

J.V. Pulé

J.C.I. Dooge

## Governing Board of the School of Cosmic Physics

### Chairman

G. Wrixon

### Senior Professors

L. Drury

E.J.A. Meurs

A.G. Jones

### Appointed Members

A. Khan

M. Bailey

S. McMurry

O. Glaser

## Administrative Staff of the Institute 2004

### Registrar:

Cecil Keaveney

### Finance Officer:

Grace Forkin

### Senior Administrative Officer:

Mary Burke

### Assistant Finance Officer:

Ronan Byrne

### Clerks:

Tony Broderick

Noreen Granahan

Margaret Loughman

Helena Moynihan

### Temporary Administrative Staff:

Edmond Barrett

Ruth Graham

### Support Staff:

Nuala Carney

Geraldine Casey,

Des Cuffe (to 31 March),

Esther Healy

Roger Jones

Barbara Judge

Patricia McDonald

James McFeeley

Michael Quinn

Collette Doyle (from 7 December)

## Staff and Scholars of the School of Celtic Studies 2004

### Senior Professors

L. Breatnach

(Director from 5 February)

F. Kelly

M. Ó Murchú

### Professors

M. McKenna

P. Ó Macháin

### Assistant Professors

A. Nic Dhonnchadha  
S. Ní Laoire  
R. Ó Maolalaigh (*until 31 December*)  
M. O Riordan

### Research Assistant

B. Ó Curnáin (*Permanent Assistant Professor from 13 December*)

### Assistant Librarians

A. Clinch (*until 19 March*)  
C. Dillon (*from 19 April*)  
G. Toland (*part-time*)

### School Administrator

E. Nic Dhonncha

### Technical Staff

ISOS  
C. Dunn (*until 12 April*)  
A.M. O'Brien

### IT Support

A. McCarthy (*part-time*)  
G. McCullagh (*part-time*)

### Scholars

C. Downham (England)  
(*until 31 August*)  
N. Evans (England)  
J. Ní Ghrádaigh (Ireland)  
E. O Raghallaigh (Ireland)  
(*from 1 October*)  
M. Griffin Wilson (America)  
(*until 30 June*)

### Professor Emeritus

P. MacCana (*Died 21 May 2004*)

### Temporary Support Staff

S. Carrick (*1 June – 16 July*)  
(*26 July – 1 October*)  
(*18 October – 12 November*)

### Staff School of Theoretical Physics 2004

#### Senior Professors

T.C. Dorlas (Director)  
D. O'Connor  
W. Nahm

#### Librarian

A. Goldsmith

#### Secretary

M. Matthews

#### Systems Administrator

R. Cunniffe

#### Post-Doctoral Scholars

S. Adams (Germany)  
J. Bru (France) (*until 31 October*)  
M. Leitner (Germany) (*from 12 July*)  
T. Tsukioka (Japan)  
B. Ydri (Algeria) (*until 31 December*)

#### Pre-Doctoral Scholars

R. Delgadillo Blando (Mexico)  
F. Garcia Flores (Mexico)  
J. Medina Garcia (Mexico)  
(*until 31 December*)  
I. Huet Hernandez (Mexico)  
(*On leave of absence from 1 September*)  
P. Castro Villareal (Mexico)  
S. Murray (Ireland)  
(*from 24 September*)

### Professor Emeritus

J.T. Lewis (*Died Jan 2004*)

### Project Staff

X. Martin (France)  
(*until 30 September*)  
"Quantum Spaces –  
Noncommutative Geometry"

M. Panero (Italy)  
"Quantum Field Theory from Matrix  
Models: An Alternative to Lattice  
Field Theory"

### Embark Initiative Postdoctoral Research Fellow

S. Kurcuoglu (Turkey)  
(*from 20 October*)  
"Aspects of Field Theories on Fuzzy  
and Non-commutative Spaces"

### Embark Initiative Postgraduate Research Scholar

S. Ní Chiagáin (Ireland)

### Staff School of Cosmic Physics 2004

#### Senior Professors

L. Drury (Director)  
E. Meurs  
A. Jones (*full-time from 1 January*)

#### Professors

D. O'Sullivan (*until 30 November*)  
T. Ray

#### Assistant Professors

B. O'Reilly  
P. Readman

### Fellows

C. Del Burgo (Spain)  
(from 1 October)  
X. Garcia (Spain)  
(from 1 December),  
A. Lim (England)  
(from 14 December)

### Experimental Officers

T. Blake  
B. Jordan (until 31 May)  
S. Dudzinski

### Senior Technical Assistants

C. Horan  
M. Smyth  
G. Wallace

### Technical Assistants

W. Dumpleton (until 28 March)  
E. Flood  
A. Grace  
(return from career break 1 June)  
S. Ledwidge (until 31 July)  
H. O'Donnell  
L. Quigley  
J. Spratt

### Clerical Staff

A. Byrne  
M. Callanan (until 29 February)  
E. Clifton  
P. Daly  
C. Woods (from 28 April)

### Scholars

A. Avdeeva (Russia) (from 1 April),  
A. Chabert (France)  
D. Coffey (Ireland)  
C. Combet (France)  
V. C. Do (Vietnam)  
Á. Gras Velázquez (Spain)  
M. Hamilton (South Africa)  
(from 24 February)  
B. O'Halloran (Ireland)  
(until 30 June)  
C. Melody (Ireland)  
F. McGroarty (Ireland) (until 31 May)  
M. Moorkamp (Germany)  
(from 1 January)  
G. Murphy (Ireland)  
J. Sheehan (Ireland)  
(from 1 January)  
M. Walpole (Ireland)  
(until 31 October)  
P. Ward (Ireland)  
E. Whelan (Ireland)  
D. Zhou (China) (until 31 October)

### Project Staff

M. Redman (England)  
(until 30 April)  
"Hot cores and massive star  
formation"  
CK Rao (India) (from 26 January)  
"Deep-probing electromagnetic  
studies of the lithosphere across the  
lapetus suture"  
C. Ravaut (France) "HADES"

### CosmoGrid

Project Scientist  
T. Lery  
Cluster Manager  
D. Golden (from 15 January)  
Project Administrator  
A. Shaw  
Post-Dotoral Researchers  
D. Avdeev (from 1 April)  
D. Froebrich  
S. Leygnac (from 1 November)  
C. Sweeney  
S. Wang  
T. Yamasaki (from 1 July)

### Professor Emeritus

D. O'Sullivan (from 1 December)

### Vacation Students

Leanne Young  
(23 August – 10 September)

### Temporary Support Staff

Ian O Connell  
(23 June – 13 August)  
Mike Woods  
(18 November – 24 November)



# Financial Statements

for year ended 31 December 2004



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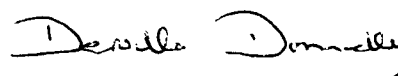
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# Statement of Responsibilities of the Council

The Council of the Dublin Institute for Advanced Studies is required under section 28(2) of the Institute for Advanced Studies Act 1940 to prepare financial statements in such form as shall be approved by the Minister for Education & Science with the concurrence of the Minister for Finance. In preparing those financial statements the Council is required to:

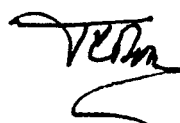
- select suitable accounting policies and apply them consistently;
- make judgements and estimates that are reasonable and prudent;
- prepare the financial statements on the going concern basis unless it is inappropriate to presume that the Institute will continue in operation; and
- disclose and explain any material departures from applicable accounting standards.

The Council is responsible for keeping proper books of account which disclose with reasonable accuracy at any time the financial position of the Institute and which enable it to ensure that the financial statements comply with Section 28(2) of the Act. The Council is responsible for safeguarding the assets of the Institute and for taking reasonable steps for the prevention and detection of fraud and other irregularities. The Council is also responsible for ensuring compliance with The Prompt Payment of Accounts Act, 1997 as detailed in the notes to the accounts.



**Dervilla Donnelly**

*Chairman – Council of the Institute*



**Tony Dorlas**

*Council Member*

# Statement on the System of Internal Financial Control

## Responsibility for system of Internal Financial Control

On behalf of the Council of the Institute I acknowledge our responsibility for ensuring that an effective system of internal financial control is maintained and operated. The system can only provide reasonable and not absolute assurance that assets are safeguarded, transactions authorised and properly recorded, and that material errors or irregularities are either prevented or would be detected in a timely period.

## Key Control Procedures

The Council has taken steps to ensure an appropriate control environment by

- clearly defining management responsibilities;
- establishing formal procedures for reporting significant control failures and ensuring appropriate corrective action.

The Council has established processes to identify and evaluate business risks by

- identifying the nature, extent and financial implication of risks facing the Institute including the extent and categories which it regards as acceptable;
- assessing the likelihood of identified risks occurring;
- assessing the Institute's ability to manage and mitigate the risks that do occur;
- assessing the costs of operating particular controls relative to the benefit obtained.

The system of internal financial control is based on a framework of regular management information, administrative procedures including segregation of duties, and a system of delegation and accountability. In particular it includes:

- comprehensive budgeting system with an annual budget which is reviewed and agreed by the Council of the Institute;
- regular reviews by the Council of periodic and annual financial reports which indicate financial performance against forecasts;
- setting targets to measure financial and other performance;
- clearly defined capital investment control guidelines;
- formal project management disciplines.

# Statement on the System of Internal Financial Control (continued)

The Audit Committee continues to review internal control matters and issues raised by the Comptroller and Auditor General and Internal Auditor.

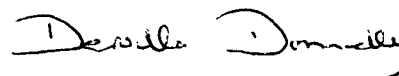
In addition, the 2004 report on internal control systems as provided by the Internal Auditor has been made available to Members of Council.

The Council's monitoring and review of the effectiveness of the system of internal financial control has in the past been based on the work of the Registrar and other officers within the Institute who have responsibility for the development and maintenance of an appropriate financial control framework. Council will not only continue to seek the input of the Registrar and other senior staff on this matter, but will also rely upon reports and comments made by the Audit Committee and the Comptroller and Auditor General in his management letter or other reports.

## Annual Review of Controls

The annual review of the effectiveness of the system of internal controls by Council did not take place in 2004. However, the review will be carried out by Council at its next meeting to be held in June 2005.

Signed on behalf of the Council of the Institute



**Dervilla Donnelly**

*Chairman – Council of the Institute*

17 June 2005



# Accounting Policies

## General

The Institute was established under the Institute for Advanced Studies Act, 1940. Its functions include the provision of facilities for the furtherance of advanced studies and the conduct of research in specialised branches of knowledge. It comprises three Schools – Celtic Studies, Theoretical Physics and Cosmic Physics.

## Accounting Policies

### 1. Basis of Accounting

The financial statements have been prepared on an accruals basis under the historical cost convention and in accordance with generally accepted accounting practice. Financial Reporting Standards recommended by the recognised accounting bodies are adopted as they become applicable.

### 2. Oireachtas Grants

Income is shown on a cash receivable basis.

### 3. Fixed Assets

Fixed Assets comprise the furniture, equipment, computers and motor vehicles of the Institute and are shown at cost less accumulated depreciation. The rates of depreciation, calculated on a straight line basis, are as follows:

Furniture and Equipment	10%
Computers	25%
Motor Vehicles	25%

Premises occupied by the Institute are leased from the Office of Public Works.

### 4. Capital Reserve

The capital reserve represents the unamortised value of income used for the purchase of Fixed Assets.

### 5. Library

Expenditure on library books and materials is written off in the year in which it is incurred.

### 6. Publications

Expenditure on publications is written off in the year in which it is incurred.

### 7. Superannuation

All superannuation benefits to or in respect of employees of the Institute under its superannuation schemes are met out of grants in the year of payment. Contributions in respect of these schemes are included in other income.

No provision is made in these financial statements for future benefits.

### 8. Projects

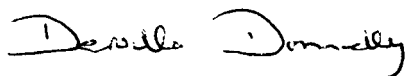
Income and expenditure on projects is reflected in the financial statements in the year to which they relate. A surplus or deficit on a project is reflected in the financial statements when realised.

# Income and Expenditure Account

	Notes	2004 €	2003 €
<b>Income</b>			
Oireachtas Grant		6,158,999	5,655,790
Sales of Publications		47,630	58,906
Projects	2	2,688,666	770,654
Other	3	129,314	133,391
		9,024,609	6,618,741
Transfer (to)/from Capital Reserve	5	47,211	(87,042)
		9,071,820	6,531,699
<b>Expenditure</b>	1		
School of Celtic Studies		1,536,803	1,474,439
School of Theoretical Physics		1,056,694	988,254
School of Cosmic Physics		4,864,723	2,559,941
Administration		1,669,661	1,571,634
		9,127,881	6,594,268
<b>Surplus/(Deficit) for year</b>		<b>(56,061)</b>	<b>(62,569)</b>
Balance at 1 January		345,629	408,198
<b>Balance at 31 December</b>		<b>289,568</b>	<b>345,629</b>

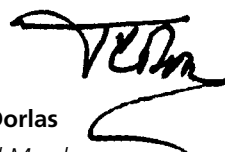
The Institute had no gains or losses in the Financial Year other than those dealt with in the Income & Expenditure Account.

The Statement of Accounting Policies and notes 1 to 13 form part of these financial statements.



**Dervilla Donnelly**

Chairman – Council of the Institute



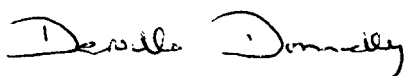
**Tony Dorlas**

Council Member

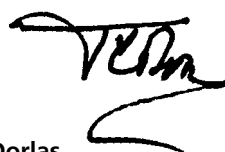
# Balance Sheet

	Notes	2004 €	2003 €
<b>Assets</b>			
Fixed Assets	4	951,355	998,566
Current Assets:			
Cash on Hand and at Bank		2,271,993	1,955,450
Debtors and Prepayments		212,414	191,026
<b>Total Assets</b>		<b>3,435,762</b>	<b>3,145,042</b>
<b>Less Liabilities</b>			
Creditors – Amounts falling due within one year:			
Creditors and Accruals		455,623	249,716
Projects	2	1,683,510	1,495,945
Creditors – Amounts falling due after one year	6	55,706	55,186
<b>Total Liabilities</b>		<b>2,194,839</b>	<b>1,800,847</b>
<b>Net Assets</b>		<b>1,240,923</b>	<b>1,344,195</b>
<b>Financed by:</b>			
Income and Expenditure Account		289,568	345,629
Capital Reserve	5	951,355	998,566
		<b>1,240,923</b>	<b>1,344,195</b>

The Statement of Accounting Policies and notes 1 to 13 form part of these financial statements.



**Dervilla Donnelly**  
Chairman – Council of the Institute

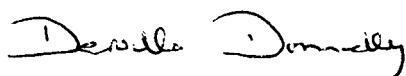


**Tony Dorlas**  
Council Member

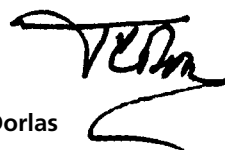
# Cash Flow Statement

	Notes	2004 €	2003 €
<b>Reconciliation of operating surplus to net cash inflow from operating activities</b>			
Surplus/(Deficit) for year		<b>(56,061)</b>	<b>(62,569)</b>
Interest received	3	(20,183)	(23,119)
Increase/(Decrease) in Creditors		206,427	(112,062)
Decrease/(Increase) in Debtors		(21,388)	(6,309)
Net Increase in Research Programmes and Fees		187,565	794,719
Depreciation	4	276,646	261,303
Capital Reserve Transfer	5	(47,211)	87,042
<b>Net Cash Inflow from operating activities</b>		<b>525,795</b>	<b>939,005</b>
<b>Cash Flow Statement</b>			
Net Cash Inflow from operating activities		525,795	939,005
<b>Returns on investments and servicing of finance</b>			
Bank Interest Received	3	20,183	23,119
<b>Capital expenditure</b>			
Purchase of Tangible Assets	4	(229,435)	(348,345)
<b>Increase in Cash</b>		<b>316,543</b>	<b>613,779</b>
<b>Reconciliation of net cash flow to movement in net funds</b>			
<b>Increase in Cash</b>		<b>316,543</b>	<b>613,779</b>
Balance at 1 January		1,955,450	1,341,671
Balance at 31 December		2,271,993	1,955,450
<b>Analysis of change in net (debt)/funds</b>			
	<b>Cash at bank and in hand €</b>	<b>Bank Overdraft €</b>	<b>Total €</b>
At beginning of year 2004	1,955,450	0	1,955,450
Cash flows	316,543	0	316,543
At end of year 2004	2,271,993	0	2,271,993

The Statement of Accounting Policies and notes 1 to 13 form part of these financial statements.



**Dervilla Donnelly**  
Chairman – Council of the Institute



**Tony Dorlas**  
Council Member



# Notes to the Financial Statements

## 1. Detailed Analysis of Income & Expenditure for the year ended 31/12/2004

	Notes	School of Celtic Studies €	School of Theoretical Physics €	School of Cosmic Physics €	Administration €	2004 Total €	2003 Total €
<b>Income</b>							
Oireachtas Grants		1,458,172	919,017	2,202,748	1,579,062	6,158,999	5,655,790
Sales of Publications		47,630				47,630	58,906
Project Income	2	1,953	98,146	2,567,382	21,185	2,688,666	770,654
Other Income	3	21,473	23,495	45,150	39,196	129,314	133,391
		1,529,228	1,040,658	4,815,280	1,639,443	9,024,609	6,618,741
Transfer (to)/from Capital Reserve		-	-	-	47,211	47,211	(87,042)
		1,529,228	1,040,658	4,815,280	1,686,654	9,071,820	6,531,699
<b>Expenditure</b>							
Payroll Costs	7	1,383,587	823,022	2,061,066	705,544	4,973,219	4,385,317
Project Costs	2	1,953	98,146	2,566,252	-	2,666,351	738,218
Library and Book Storage		33,501	100,921	60,350	17,489	212,261	222,264
Depreciation	4	-	-	-	276,646	276,646	261,303
Rent, Rates and Insurance					126,665	126,665	183,010
General Expenses	8	8,970	1,562	30,167	147,123	187,822	142,400
Travel and Seminar Expenses		36,395	17,948	69,486	8,360	132,189	116,169
Premises Maintenance and Security		677	476	11,090	148,680	160,923	166,521
Computer and Internet expenses		5,206	5,449	39,360	59,046	109,061	118,901
Fuel Light and Power					76,375	76,375	63,646
Postage and Telephone					58,418	58,418	62,010
Stationery		15,680	3,584	7,796	32,757	59,817	58,703
Publications		48,044	-	1,481		49,525	65,238
Advertising		300	2,473		6,600	9,373	10,568
Minor Office Equipment		2,490	3,113	17,675	5,958	29,236	-
		1,536,803	1,056,694	4,864,723	1,669,661	9,127,881	6,594,268
<b>Surplus/(Deficit) For Year</b>		<b>(7,575)</b>	<b>(16,036)</b>	<b>(49,443)</b>	<b>16,993</b>	<b>(56,061)</b>	<b>(62,569)</b>
Balance at 1 January		298,247	116,196	(105,387)	36,753	345,629	408,198
<b>Balance at 31 December</b>		<b>290,672</b>	<b>100,160</b>	<b>(154,830)</b>	<b>53,746</b>	<b>289,568</b>	<b>345,629</b>

**2. Projects**

	<b>2004</b> €	<b>2003</b> €
Opening Balances	1,495,945	701,226
Receipts	2,876,231	1,565,373
	4,372,176	2,266,599
Closing Balances	(1,683,510)	(1,495,945)
Applied as Income	2,688,666	770,654
<b>Income Allocation</b>		
School of Celtic Studies	1,953	2,292
School of Theoretical Physics	98,146	57,003
School of Cosmic Physics	2,567,382	678,923
	2,667,481	738,218
Administration	21,185	32,436
Total Project Income	2,688,666	770,654

**Project Costs**

	<b>Celtic Studies</b> €	<b>Theoretical Physics</b> €	<b>Cosmic Physics</b> €	<b>2004 Total</b> €	<b>2003 Total</b> €
Payments to Partners/Associates		-	1,914,393	1,914,393	280,550
Salaries/Scholarships		95,776	510,168	605,944	307,320
Travel		1,772	82,062	83,834	91,495
Other	1,953	598	59,629	62,180	58,853
Total Project Costs	1,953	98,146	2,566,252	2,666,351	738,218

**3. Other Income**

	<b>2004</b> €	<b>2003</b> €
Superannuation contributions	85,394	73,570
Bank interest	20,183	23,119
Fees & grants	17,037	714
Other	6,700	35,988
Total	129,314	133,391

#### 4. Fixed Assets

	Furniture & Equipment €	Motor Vehicles €	Computers €	Total €
<b>Cost</b>				
Opening Balance 1/1/2004	1,879,373	63,627	2,219,187	4,162,187
Additions	90,033	0	139,402	229,435
Disposals*	75,406	17,663	1,253,959	1,347,028
	1,894,000	45,964	1,104,630	3,044,594
<b>Depreciation</b>				
Opening Balance 1/1/2004	1,236,831	54,006	1,872,784	3,163,621
Charge 2004	118,139	9,423	149,084	276,646
Disposals*	46,182	17,663	1,283,183	1,347,028
	1,308,788	45,766	738,685	2,093,239
Net book value 31/12/2004	585,212	198	365,945	951,355
Net book value 31/12/2003	642,542	9,621	346,403	998,566

Note\* Fully depreciated assets removed from register in prior periods, not posted to books of account.

#### 5. Capital Reserve

	2004 €	2003 €
Balance at 1 January	998,566	911,524
<b>Transfer from/(to) Income and Expenditure Account</b>		
Income allocated to acquire fixed assets	229,435	348,345
Amortisation in line with asset depreciation	(276,646)	(261,303)
Amount released on disposals	0	0
	(47,211)	87,042
<b>Balance at 31 December</b>	<b>951,355</b>	<b>998,566</b>

#### 6. Creditors due after twelve months

	2004 €	2003 €
These comprise: Vernam Hull Bequest	53,295	52,775
Carmody Fund	2,411	2,411
	<b>55,706</b>	<b>55,186</b>

The funds relating to the above are held on deposit. No amounts were utilised during the year.

**7. Payroll Costs**

	<b>Celtic Studies €</b>	<b>Theoretical Physics €</b>	<b>Cosmic Physics €</b>	<b>Admin €</b>	<b>2004 Total €</b>	<b>2003 Total €</b>
Salaries/Wages	1,075,790	500,248	1,339,433	627,555	3,543,026	3,209,887
Superannuation	211,347	63,784	409,081	47,338	731,550	716,968
Gratuity	-	-	128,842	28,151	156,993	-
Scholarships	77,628	141,431	152,697	-	371,756	332,776
Visitors	17,458	117,559	31,013	-	166,030	125,386
Honoraria	1,364	-	-	2,500	3,864	300
	<b>1,383,587</b>	<b>823,022</b>	<b>2,061,066</b>	<b>705,544</b>	<b>4,973,219</b>	<b>4,385,317</b>

**8. General Expenses**

	<b>Celtic Studies €</b>	<b>Theoretical Physics €</b>	<b>Cosmic Physics €</b>	<b>Admin €</b>	<b>2004 Total €</b>	<b>2003 Total €</b>
Miscellaneous	4,634	(511)	13,544	32,455	50,122	69,344
Promotions/Lunches	3,773	2,073	2,316	6,248	14,410	23,605
Professional Fees				82,887	82,887	16,000
Training	563		14,307	3,392	18,262	14,050
Audit Fee				13,200	13,200	11,000
Bank Charges				3,954	3,954	3,664
Health & Safety	-	-	-	4,987	4,987	4,737
	<b>8,970</b>	<b>1,562</b>	<b>30,167</b>	<b>147,123</b>	<b>187,822</b>	<b>142,400</b>

**9. Leasing****Operating Leases**

The premises occupied by the Institute are leased from the Office of Public Works.

The commitment on foot of such leases in respect of 2005 is €55,519.



## 10. Superannuation

The Board operates a defined benefit superannuation scheme for its employees. Superannuation entitlements arising under the scheme are paid out of current income and are charged to the Income & Expenditure Account in the year in which they become payable. No provision is made in the financial statements in respect of future benefits.

For the accounting periods beginning on or after 1 January 2005, Financial Reporting Standard 17 will require financial statements to reflect at fair value the assets and liabilities arising from an employer's superannuation obligations and any related funding and to recognise the cost of providing superannuation benefits in the accounting periods in which they are earned by employees. As a transitional measure the Standard requires that the present value of scheme liabilities are disclosed in the notes to the 2004 financial statements. This information is set out below.

**The superannuation scheme is unfunded and thus there are no assets set aside to meet future obligations.**

	<b>Market Value</b>
	<b>31/12/2004</b>
	<b>€000s</b>
The market value of Assets	nil
Present Value of pension scheme liabilities	25,391
Net Deficit in pension scheme	(25,391)
Net Pension Asset	-
Net Pension Liability	25,391

A full actuarial calculation was carried out at 31st December 2004 by Mercer Human Resource Consulting. If the requirements of FRS17 had been implemented in full, the following shows the effect on the financial statements.

The financial assumptions used to calculate the components of the defined benefit cost for the year ended December 31, 2004 were as follows:

<b>Valuation Method</b>	<b>Projected Unit</b>
Discount Rate	5.25%
Inflation Rate	2.25%
Rate of Salary Increases	4.00%
Rate of Pension Increases	4.00%

<b>Analysis of the amount which would be charged to operating profit is as follows:</b>	<b>€000s</b>
Current Service Cost	571
Past Service Cost	-

**10. Superannuation (continued)****Analysis of the amount which would be treated as a finance cost:**

Interest on scheme liabilities	1,207
Expected return on scheme Assets	-

**Analysis of the amount which would be recognised in the statement of total recognised gains and losses is as follows:**

Actual less expected return on scheme assets	-
Experience gains and losses	975
Changes in assumptions	(2,174)
Actuarial gain recognised	(1,199)

**Analysis of the movement in surplus during the year is as follows:**

Deficit at 1/1/2004	(22,984)
Current Service Cost	(571)
Contributions	570
Past Service Cost	-
Finance Cost	(1,207)
Actuarial gain	(1,199)
Deficit at 31/12/2004	(25,391)

**11. Disclosure of Transactions**

The Council of the Institute adopts procedures in accordance with guidelines issued by the Department of Finance in relation to the disclosure of interests by Council Members and these procedures have been adhered to by the Council Members during the year. No Council Member has declared an interest.

**12. Contingent Liabilities**

Legal proceedings against the Institute have been initiated by the former Registrar. It is not possible to anticipate the outcome of such proceedings nor their financial impact, if any.

**13 Approval of Accounts**

The Financial Statements were approved by Council on 17 June 2005.

# Report of the Comptroller and Auditor General for presentation to the Houses of the Oireachtas

I have audited the financial statements on pages 35 to 44 under Section 28(3) of the Institute for Advanced Studies Act, 1940.

## **Respective Responsibilities of the Council and the Comptroller and Auditor General**

The accounting responsibilities of the Council of the Institute are set out in the Statement of Responsibilities of the Council on page 32. It is my responsibility, based on the audit, to form an independent opinion of the financial statements presented to me by the Council and to report on them.

I review whether the statement on the system of internal financial control on pages 33 and 34 reflects the Institute's compliance with applicable guidance on corporate governance and report any material instance where it does not do so, or if the statement is misleading or inconsistent with other information of which I am aware from my audit of the financial statements.

## **Basis of Audit Opinion**

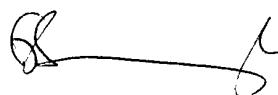
In the exercise of my function as Comptroller and Auditor General, I conducted my audit of the financial statements in accordance with auditing standards issued by the Auditing Practices Board and by reference to the special considerations which attach to State bodies in relation to their management and operation.

An audit includes examination, on a test basis, of evidence relevant to the amounts and disclosures in the financial statements. It also includes an assessment of the significant estimates and judgments made in the preparation of the financial statements, and of whether the accounting policies are appropriate to the Institute's circumstances, consistently applied and adequately disclosed.

I planned and performed my audit so as to obtain all the information and explanations that I considered necessary to provide me with sufficient evidence to give reasonable assurance that the financial statements are free from material misstatement whether caused by fraud or other irregularity or error. In forming my opinion I also evaluated the overall adequacy of the presentation of information in the financial statements.

## **Opinion**

In my opinion, proper books of account have been kept by the Institute, and the financial statements, which are in agreement with them, give a true and fair view of the state of affairs of the Dublin Institute for Advanced Studies at 31 December 2004 and of its income and expenditure and cash flow for the year then ended.



**Gerard Smyth**

*For and on behalf of the  
Comptroller and Auditor General*

23 June 2005



# Ráitis Airgeadais

don bhliain dár críoch 31 Nollaig 2004



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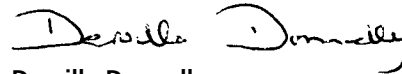
## Ábhar

# Ráiteas Freagrachtaí na Comhairle

Éilítear ar Chomhairle Institiúid Ard-Léinn Bhaile Átha Cliath faoi alt 28(2) den Acht um Institiúid Ard-Leighinn, 1940 le ráitis airgeadais a ullmhú ar shlí a cheadóidh an tAire Oideachais & Eolaíochta le comhthoiliú an Aire Airgeadais. Agus an Chomhairle ag ullmhú na ráitis airgeadais sin éilítear uirthi:

- polasaithe cuntasáíochta oiriúnacha a roghnú agus iad a chur i bhfeidhm go comhleanúnach;
- breithiúnais agus meastacháin a dhéanamh atá réasúnach agus stuama;
- na ráitis airgeadais a ullmhú ar bhonn gnóthais leantach mura bhfuil sé míchuí glacadh leis go leanfaidh an Institiúid ag oibriú; agus
- aon imeacht ábhartha ó chaighdeán chuntasaíochta is infheidhme a nochtadh agus a mhíniú

Tá freagracht ar an gComhairle leabhair chuntais chearta a choinneáil a nochtáíonn ag aon am le cruinneas réasúnach staid airgeadais na hInstitiúide agus a chuireann ar a cumas a chinntiú go gcloíonn na ráitis airgeadais le hAlt 28(2) den Acht. Tá freagracht ar an gComhairle sócmhainní na hInstitiúide a shlánú agus as céimeanna réasúnacha a ghlacadh le cosc a chur ar chalaois agus ar neamhrialtachtaí eile agus iad a aimsiú. Tá freagracht ar an gComhairle chomh maith a chinntiú go gcomhlíontar An tAcht um Íoc Pras Cuntas, 1997 mar atá sonraithe sna nótaí do na cuntais.



**Dervilla Donnelly**

*Cathaoirleach – Comhairle na hInstitiúide*



**Tony Dorlas**

*Comhalta den Chomhairle*

# Ráiteas faoin gCóras Rialaithe Airgeadais Inmheánaigh

## Freagracht as an gCóras Rialaithe Airgeadais Inmheánaigh

Thar ceann Chomhairle na hInstitiúide is mian liom ár bhfreagracht a chur in iúl lena chinntiú go ndéantar cothabháil agus go n-oibrítear córas rialaithe airgeadais inmheánaigh.

Ní féidir leis an gcóras ach dearbhú réasúnach agus ní dearbhú críochnaitheach a chur ar fáil go ndéantar slánú ar shócmhainní, go mbíonn idirbheartaíochtaí údaraithe agus taifeadta i gceart, agus go gcuirtear cosc ar earráidí ábhartha nó ar neamhrialtachtaí nó go n-aimseofaí iad i dtréimhse chaoithiúil.

## Nósanna Imeachta Rialaithe Lárnacha

Tá céimeanna glactha ag an gComhairle lena chinntiú go mbeidh timpeallacht rialaithe chuí i bhfeidhm trí

- sainmhíniú soiléir a thabhairt maidir le freagrachtaí bainistíochta;
- nósanna imeachta foirmiúla a bhunú le teipeanna rialaithe suntasacha a thuairisciú agus lena chinntiú go dtógtar gníomh cuí leis an gceist a cheartú.

Tá próisis bunaithe ag an gComhairle le rioscaí gnó a aithint agus iad a luacháil trí

- nádúr, méid agus tionchar airgeadais na rioscaí a bhíonn os comhair na hInstitiúide a aithint lena n-áirítear méid agus catagóir a mheasann an Institiúid a bheith inghlactha;

- measúnú a dhéanamh ar an dóchúlacht atá ann go dtarlóidh na rioscaí aitheanta;
- measúnú a dhéanamh ar chumas na hInstitiúide na rioscaí a tharlaíonn a bhainistiú agus a mhaolú;
- measúnú a dhéanamh ar na costais a bhaineann le rialacháin áirithe a oibriú a bhaineann leis an sochar a bhaintear amach.

Tá an córas rialaithe airgeadais inmheánaigh bunaithe ar chreat oibre eolais bainistíochta rialta, nósanna imeachta riaracháin lena n-áirítear dualgais a roinnt, agus córas toscaireachta agus cuntasachta. Áirítear leis go háirithe:

- córas buiséid cuimsitheach le buiséad bliantúil a ndéanann Comhairle na hInstitiúide athbhreithniú air agus a bhíonn comhaontaithe aici;
- athbhreithnithe rialta ag an gComhairle ar thuairiscí airgeadais tréimhseacha agus bliantúla a léiríonn feidhmíocht airgeadais in aghaidh réamhaisnéisí;
- spriocanna a leagan síos le feidhmíocht airgeadais agus feidhmíocht eile a thomhas;
- treoirlínte rialaithe infheistíochta caipitil a bhíonn sainmhínithe go soiléir;
- disciplíní bainistíochta tionscadal foirmiúla.

# Ráiteas faoin gCóras Rialaithe Airgeadais Inmheánaigh (ar lean)

Lean an Coiste Iniúchta ag déanamh athbhreithniú (Tá an Coiste Iniúchta ag leanúint ag déanamh athbhreithniú) ar shaincheisteanna rialaithe inmheánaigh agus saincheisteanna a d'ardaigh an tArd-Reachtaire Cuntas agus Ciste. Ina theannta sin, cuireadh tuarascáil an Reachtaire inmheánaigh ar chórais rialaithe inmheánaigh don bhliain 2004 ar fáil do bhaill na Comhairle.

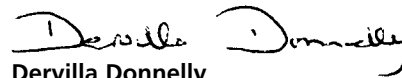
Bhíodh monatóireacht agus athbhreithniú na Comhairle ar éifeachtúlacht an chórais rialaithe airgeadais inmheánaigh bunaithe roimhe seo ar obair an Chláraitheora agus oifigigh eile laistigh den Institiúid atá freagrach as creat oibre rialaithe airgeadais cuí a fhorbairt agus a chothabháil.

Ní hamháin go leanfaidh an Chomhairle ag lorg ionchuir ón gCláraitheoir agus ó fhoireann shinsearach eile maidir leis an ábhar seo, ach beidh sí ag brath ar thuairiscí agus ar thuairimí a dhéanfaidh an Coiste Iniúchta agus an tArd-Reachtaire Cuntas agus Ciste ina litir bhainistíochta nó i dtuairiscí eile.

## Athbhreithniú Bliantúil ar Rialacháin

Ní dhearna an Chomhairle athbhreithniú ar éifeachtas chórais rialaithe airgeadais inmheánaigh na hInstitiúide i 2004. Déanfaidh an Chomhairle an t-athbhreithniú sin ag an gcéad chruinniú eile i mí Iúil 2005

Sínithe thar ceann Chomhairle na hInstitiúide



**Dervilla Donnelly**

*Cathaoirleach – Comhairle na hInstitiúide*

17 Meitheamh 2005



# Polasaithe Chuntasaíochta

## Ginearálta

Bunaíodh an Institiúid faoin Acht um Institiúid Ard-Leighinn, 1940. Áirítear ar a cuid feidhmeanna saoráidí a sholáthar le hard-léinn a chur chun cinn tuilleadh agus le taighde a dhéanamh i mbrainsí speisialtachta eolais. Tá trí Scoil inti – Scoil an Léinn Cheiltigh, Scoil na Fisice Teoiriciúla agus Scoil na Fisice Cosmaí.

## Polasaithe Chuntasaíochta

### 1. Bunús Cuntasaíochta

Tá na ráitis airgeadais ullmhaithe ar bhonn fabhraithe faoin gcoinbhinsiún costais stairiúil agus de réir chleachtas cuntasaíochta a nglactar leo tríd is tríd. Glactar le Caighdeán Thuairiscithe Airgeadais a bhí molta ag na comhlachtaí chuntasaíochta aitheanta mar is infheidhme iad.

### 2. Deontais Oireachtais

Taispeántar ioncam ar bhunús airgid isteach.

### 3. Sócmhainní Seasta

Is éard is Sócmhainní Seasta ann ná troscán, trealamh, ríomhairí agus mótarfheithiclí na hInstitiúide agus taispeántar iad ag costas lúide dímhéas carntha. Is mar seo a leanas atá na rátaí dímhéasa, ríofa ar bhunús dronlíneach:

Troscán agus Trealamh	10%
Ríomhairí	25%
Mótarfheithiclí	25%

Faightear áitribh atá i seilbh na hInstitiúide ar léas ó Oifig na nOibreacha Poiblí.

### 4. Cúlchiste Caipitil

Léiríonn cúlchiste caipitiúil luach neamh-amúchta ioncaim a úsáidtear le Sócmhainní Seasta a cheannach.

### 5. Leabharlann

Díscríobhtar caiteachas ar leabhair leabharlainne agus ábhair sa bhliain a dtabhaítear é.

### 6. Foilseacháin

Díscríobhtar caiteachas ar fhoilseacháin sa bhliain a dtabhaítear é.

### 7. Aoisliúntas

Déantar freastal ar gach sochar aoisliúntais d'fhostaithe agus maidir le fostaithe na hInstitiúide faoi na scéimeanna aoisliúntais amach as deontais sa bhliain íocaíochta. Áirítear ranníocaí maidir leis na scéimeanna seo in ioncam eile. Níl aon fhoráil déanta sna ráitis airgeadais seo i gcás sochair amach anseo.

### 8. Tionscadail

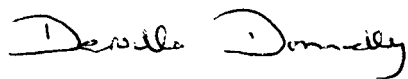
Léirítear ioncam agus caiteachas ar thionscadail sna ráitis airgeadais sa bhliain lena mbaineann siad. Taispeántar barrachas nó easnamh tionscadail sna ráitis airgeadais nuair a léirítear sin.

# Cuntas Ioncaim agus Caiteachais

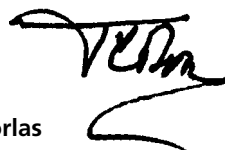
	Nótaí	2004 €	2003 €
<b>Ioncam</b>			
Deontas Oireachtais		6,158,999	5,655,790
Díolacháin Foilseachán		47,630	58,906
Tionscadail	2	2,688,666	770,654
Eile	3	129,314	133,391
		9,024,609	6,618,741
Aistriú (chuig)/ó Cúlchiste Caipitil	5	47,211	(87,042)
		9,071,820	6,531,699
<b>Caiteachas</b>	1		
Scoil an Léinn Cheiltigh		1,536,803	1,474,439
Scoil na Fisice Teoiriciúla		1,056,694	988,254
Scoil na Fisice Cosmaí		4,864,723	2,559,941
Riarachán		1,669,661	1,571,634
		9,127,881	6,594,268
<b>Barraíocht/(Easnamh) don bhliain</b>		<b>(56,061)</b>	<b>(62,569)</b>
Iarmhéid amhail an 1 Eanáir		345,629	408,198
<b>Iarmhéid amhail an 31 Nollaig</b>		<b>289,568</b>	<b>345,629</b>

Ní raibh ghnóthachan ná aon chailteanas ag an Institiúid sa Bhliain Airgeadais ach amháin iad sin a láimhsítear sa Chuntas Ioncaim agus Caiteachais.

Is cuid de na ráitis airgeadais sin é an Ráiteas Beartais Cuntasaíochta agus nótaí 1 go dtí 13.



**Dervilla Donnelly**  
Cathaoirleach – Comhairle na hInstitiúide

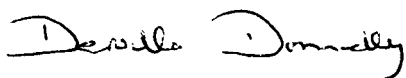


**Tony Dorlas**  
Comhalta den Comhairle

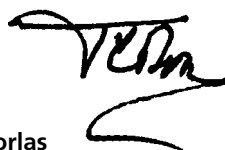
# Clár Comhardaithe

	Nótaí	2004 €	2003 €
<b>Sócmhainní</b>			
Sócmhainní Seasta	4	951,355	998,566
Sócmhainní Reatha:			
Airgead sa Lámh agus ag an mBanc		2,271,993	1,955,450
Féichiúnaithe agus Réamhíocaíochtaí		212,414	191,026
<b>Sócmhainní Iomlána</b>		<b>3,435,762</b>	<b>3,145,042</b>
<b>Lúide Dliteanais</b>			
Creidiúnaithe – Méideanna atá dlite laistigh de bhliain amháin:			
Creidiúnaithe agus Fabhruithe		455,623	249,716
Tionscadail	2	1,683,510	1,495,945
Creidiúnaithe – méideanna atá dlite tar éis bliana amháin	6	55,706	55,186
<b>Dliteanais Iomlána</b>		<b>2,194,839</b>	<b>1,800,847</b>
<b>Sócmhainní Glana</b>		<b>1,240,923</b>	<b>1,344,195</b>
<b>Maoinithe ag:</b>			
Cuntas Ioncaim agus Caiteachais		289,568	345,629
Cúlchiste Caipitil	5	951,355	998,566
		<b>1,240,923</b>	<b>1,344,195</b>

Is cuid de na ráitis airgeadais seo é an Ráiteas Beartais Cuntasaíochta agus na nótaí ó 1 go dtí 13.



**Dervilla Donnelly**  
Cathaoirleach – Comhairle na hInstitiúide

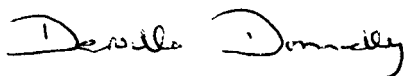


**Tony Dorlas**  
Comhalta den Comhairle

# Ráiteas Sreabhadh Airgid

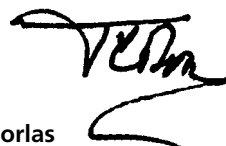
	Nótaí	2004 €	2003 €
<b>Réiteach barrachais oibríochta chuig glan-insreabhadh</b>			
<b>airgid ó ghníomhaíochtaí oibríochta</b>			
Barrachas/(Easnamh) don bhliain		(56,061)	(62,569)
Ús infhaighte	3	(20,183)	(23,119)
Ardú/(Laghdú) i gCreidiúnaithe		206,427	(112,062)
Laghdú/(Ardú) i bhFéichiúnaithe		(21,388)	(6,309)
Glan-ardú i gCláir Thaighde agus Táillí		187,565	794,719
Dímheas	4	276,646	261,303
Aistriú Cúlchiste Caipitil	5	(47,211)	87,042
<b>Glaninsreabhadh Airgead tirim ó ghníomhaíochtaí oibríochta</b>		<b>525,795</b>	<b>939,005</b>
<b>Ráiteas Sreabhadh Airgid</b>			
Glaninsreabhadh airgid ó ghníomhaíochtaí oibríochta		525,795	939,005
<b>Aischiú ar infheistíochtaí agus seirbhísí airgeadais</b>			
Ús Bainc Infhaighte	3	20,183	23,119
<b>Caiteachas Caipitiúil</b>			
Ceannach Sócmhainní Inláimhsithe	4	(229,435)	(348,345)
<b>Ardú ar Airgead</b>		<b>316,543</b>	<b>613,779</b>
<b>Réiteach glaninsreabhadh airgead tirim chuig gluaiseacht i nglanchistí</b>			
<b>Ardú ar Airgead Tirim</b>		<b>316,543</b>	<b>613,779</b>
Iarmhéid amhail an 1 Eanáir		1,955,450	1,341,671
Iarmhéid amhail an 31 Nollaig		2,271,993	1,955,450
<b>Anailís ar arthrú i nglanchistí (fiacha)</b>	<b>Airgead infhaighte sa Bhanc €</b>	<b>Ró tharraingt €</b>	<b>Iomlán €</b>
I dtús na bliana 2004	1,955,450	0	1,955,450
Sreabhadh Airgid	316,543	0	316,543
Ag deireadh na bliana 2004	2,271,993	0	2,271,993

Is cuid de na ráitis airgeadais seo é an Ráiteas Beartais Chuntasaíochta agus nótaí 1 go dtí 13.



**Dervilla Donnelly**

Cathaoirleach – Comhairle na hInstitiúide



**Tony Dorlas**

Comhalta den Comhairle

# Nótaí do na Ráitis Airgeadais

## 1. Anailís Shonraithe d'Ioncam & Caiteachas don bhliain dár críoch 31/12/2004

	Nótaí	Léann Cheilteach €	Fisic Theoiriciúil €	Fisic Chosmach €	Fisic Riarachán €	2004 Iomlán €	2003 Iomlán €
<b>Ioncam</b>							
Deontais Oireachtais		1,458,172	919,017	2,202,748	1,579,062	6,158,999	5,655,790
Díolacháin Foilseachán		47,630				47,630	58,906
Ioncam Tionscadail	2	1,953	98,146	2,567,382	21,185	2,688,666	770,654
Ioncam Eile	3	21,473	23,495	45,150	39,196	129,314	133,391
		1,529,228	1,040,658	4,815,280	1,639,443	9,024,609	6,618,741
Aistriú (chuig) ó Chúlchiste Caipitil		-	-	-	47,211	47,211	(87,042)
		1,529,228	1,040,658	4,815,280	1,686,654	9,071,820	6,531,699
<b>Caiteachas</b>							
Costais Phárolla	7	1,383,587	823,022	2,061,066	705,544	4,973,219	4,385,317
Costais Tionscnamh	2	1,953	98,146	2,566,252	-	2,666,351	738,218
Stóráil Leabharlainne agus Leabhar		33,501	100,921	60,350	17,489	212,261	222,264
Dímheas	4	-	-	-	276,646	276,646	261,303
Cíos, Rátaí agus Árachas					126,665	126,665	183,010
Costais Ghinearálta	8	8,970	1,562	30,167	147,123	187,822	142,400
Costais Taistil agus Seimineáir		36,395	17,948	69,486	8,360	132,189	116,169
Cothabháil Áitribh agus Slándáil		677	476	11,090	148,680	160,923	166,521
Costais ríomhairí agus Idirlíon		5,206	5,449	39,360	59,046	109,061	118,901
Breosla Solas agus Cumhacht					76,375	76,375	63,646
Post agus Teileafón					58,418	58,418	62,010
Páipéarachas		15,680	3,584	7,796	32,757	59,817	58,703
Foilseacháin		48,044	-	1,481		49,525	65,238
Fógraíocht		300	2,473		6,600	9,373	10,568
Mion Trealamh Oifige		2,490	3,113	17,675	5,958	29,236	-
		1,536,803	1,056,694	4,864,723	1,669,661	9,127,881	6,594,268
<b>Barraíocht/(Easnamh) Don Bhliain</b>							
Iarmhéid amhail an 1 Eanáir		(7,575)	(16,036)	(49,443)	16,993	(56,061)	(62,569)
Iarmhéid amhail an 31 Nollaig		298,247	116,196	(105,387)	36,753	345,629	408,198
		<b>290,672</b>	<b>100,160</b>	<b>(154,830)</b>	<b>53,746</b>	<b>289,568</b>	<b>345,629</b>



**2. Tionscadail**

	<b>2004</b> €	<b>2003</b> €
larmhéideanna Tosaigh	1,495,945	701,226
Admhálacha	2,876,231	1,565,373
	4,372,176	2,266,599
larmhéideanna Deiridh	(1,683,510)	(1,495,945)
Curtha i bhfeidhm mar ioncam	2,688,666	770,654
<b>Leithroinnt Ioncaim</b>		
Scoil an Léinn Cheiltigh	1,953	2,292
Scoil na Fisice Teoiriciúla	98,146	57,003
Scoil na Fisice Cosmaí	2,567,382	678,923
	2,667,481	738,218
Riarachán	21,185	32,436
Ioncam Iomlán Thionscadal	2,688,666	770,654

**Costais Tionscadal**

	<b>Léann</b> <b>Cheilteach</b> €	<b>Fisic</b> <b>Theoiriciúil</b> €	<b>Fisic</b> <b>Chosmach</b> €	<b>2004</b> <b>Iomlán</b> €	<b>2003</b> <b>Iomlán</b> €
Íocaíochtaí chuig Páirtithe/Comhlachais		-	1,914,393	1,914,393	280,550
Tuarastail/Scoláireachtaí		95,776	510,168	605,944	307,320
Taisteal		1,772	82,062	83,834	91,495
Eile	1,953	598	59,629	62,180	58,853
Costas Iomlán Thionscadal	1,953	98,146	2,566,252	2,666,351	738,218

**3. Ioncam Eile**

	<b>2004</b> €	<b>2003</b> €
Ranníochaíochtaí Aoisliúntas	85,394	73,570
Ús bainc	20,183	23,119
Táillí & Deontais	17,037	714
Eile	6,700	35,988
Iomlán	129,314	133,391

#### 4. Sócmhainní Seasta

	Troscán & Trealamh €	Mótar- fheithicilí €	Ríomhairí €	Iomlán €
<b>Costais</b>				
Iarmhéid Tosaigh 1/1/2004	1,879,373	63,627	2,219,187	4,162,187
Breiseanna	90,033	0	139,402	229,435
Riartha *	75,406	17,663	1,253,959	1,347,028
	1,894,000	45,964	1,104,630	3,044,594
<b>Dímheas</b>				
Iarmhéid Tosaigh 1/1/2004	1,236,831	54,006	1,872,784	3,163,621
Muirear 2004	118,139	9,423	149,084	276,646
Riartha*	46,182	17,663	1,283,183	1,347,028
	1,308,788	45,766	738,685	2,093,239
Luach glan de réir na leabhar 31/12/2004	585,212	198	365,945	951,355
Luach glan de réir na leabhar 31/12/2003	642,542	9,621	346,403	998,566

\*Nóta: Sócmhainní lándímheasta bainte den chlár i dtreimhsí roimhe, gan a bheith aistrithe go dtí leabhair na gcuntas.

#### 5. Cúlchiste Caipitil

	2004 €	2003 €
Iarmhéid amhail an 1 Eanáir	998,566	911,524
<b>Aistriú ó/(chuig) Cuntas Ioncaim agus Caiteachais</b>		
Ioncam leithroinnte le sócmhainní seasta a fháil	229,435	348,345
Amúchadh ag teacht le dímheas sócmhainní	(276,646)	(261,303)
Méid scaoilte ar dhiúscairtí	0	0
	(47,211)	87,042
<b>Iarmhéid amhail an 31 Nollaig</b>	<b>951,355</b>	<b>998,566</b>

#### 6. Creidiúnaithe dlíthe tar éis dhá mhí dhéag

	2004 €	2003 €
Comhdhéanta as: Vernam Hull Bequest	53,295	52,775
Carmody Fund	2,411	2,411
	<b>55,706</b>	<b>55,186</b>

Tá an t-airgead a bhaineann leo seo sealbhaithe mar éarlais. Níor baineadh úsáid as aon mhéideanna le linn na bliana.

## 7. Costais Phárolla

	Léann Cheilteach €	Fisic Theoiriciúil €	Fisic Chosmach €	Riar. €	2004 Iomlán €	2003 Iomlán €
Tuarastal/Pá	1,075,790	500,248	1,339,433	627,555	3,543,026	3,209,887
Aoisliúntas	211,347	63,784	409,081	47,338	731,550	716,968
Airgead Scoir	-	-	128,842	28,151	156,993	-
Scoláireachtaí	77,628	141,431	152,697	-	371,756	332,776
Cuairteoirí	17,458	117,559	31,013	-	166,030	125,386
Honoraria	1,364	-	-	2,500	3,864	300
	1,383,587	823,022	2,061,066	705,544	4,973,219	4,385,317

## 8. Costais Ghinearálta

	Léann Cheilteach €	Fisic Theoiriciúil €	Fisic Chosmach €	Riar. €	2004 Iomlán €	2003 Iomlán €
Ilghnéitheach	4,634	(511)	13,544	32,455	50,122	69,344
Tionscnaimh cur chun cinn/Lóin	3,773	2,073	2,316	6,248	14,410	23,605
Táillí Gairmiúla				82,887	82,887	16,000
Oiliúint	563		14,307	3,392	18,262	14,050
Táille Iniúchta				13,200	13,200	11,000
Muirir Bhainc				3,954	3,954	3,664
Sláinte & Sábháilteacht	-	-	-	4,987	4,987	4,737
	8,970	1,562	30,167	147,123	187,822	142,400

## 9. Léasáil

## Léasanna Oibríochta

Tá na háitribh atá i seilbh na hInstitiúide ar léas ó Oifig na nOibreacha Poiblí. Is é an tiomantas ar scór léasanna den sórt sin maidir le 2005 ná €55,519.

## 10. Aoisliúntas

Oibríonn an Bord scéim aoisliúntais sochair sainithe dá chuid fostaithe. Íoctar teidlíochtaí aoisliúntas a thagann chun cinn faoin scéim amach as ioncam reatha agus gearrtar ar an gCuntas Ioncaim agus Caiteachais iad sa bhliain ina mbíonn siad iníoctha. Níl aon foráil sna ráitis airgeadais maidir le sochair amach anseo.

I gcás thréimhsí cuntasáochta ag tosú an 1 Eanáir 2005 nó dá éis, éileoidh Tuairisciú Airgeadais Caighdeánach 17 ráitis airgeadais chun léiriú a fháil ar shócmhainní agus ar dhliteanas ag an luach cothrom a thagann chun cinn ó oibleagáidí aoisliúntais fostóra agus aon mhaoiniú bainteach agus aitheantas a thabhairt don chostas a bhaineann le sochair aoisliúntas a sholáthar sna tréimhsí cuntasáochta ina dtuilleann fostaithe iad.

Mar bheart idirthréimhseach éilíonn an Caighdeán go nochtófaí luach reatha dliteanas scéime sna nótaí do na ráitis airgeadais 2004. Tá an t-eolas leagtha amach thíos.

**Tá an scéim aoisliúntais neamh-mhaoinithe agus mar sin níl aon sócmhainní leagtha ar leataobh le freastal ar oibleagáidí amach anseo.**

	Luach ar an margadh €000'anna
Luach na Sócmhainní ar an margadh	nil
Luach láithreach na ndlíteanas scéime pinsin	25,391
Glan-easnamh sa scéim pinsin	(25,391)
Glan sócmhainn Pinsin	-
Glandhliteanas Pinsin	25,391

Rinne Mercer Human Resource Consulting ríomh iomlán achtúireach an 31ú Nollaig 2004. Dá mbeadh ceanglais FRS17 feidhmithe go hiomlán, léiríonn sé seo a leanas an tionchar a bheadh aige ar na ráitis airgeadais.

Bhí na boinn tuisceana airgeadais a úsáideadh leis na comhchuideanna den chostas sochair sainithe a ríomh don bhliain dár críoch 31 Nollaig, 2004 mar seo a leanas:

Modh Luachála	Aonad Réamh-Mheasta
Ráta Lascaine	5.25%
Ráta Boilscithe	2.25%
Ráta Arduithe Tuarastal	4.00%
Ráta Arduithe Pinsean	4.00%

**Is mar seo a leanas atá an anailís ar an méid a ghearrfaí mar mhuirear ar bhrabús oibríochta:**

	€000s
Costas Seirbhíse Reatha	571
Costas Seirbhíse Roimhe Seo	-

## 10. Aoisliúntas (continued)

### Anailís ar an méid a láimhseofaí mar chostas airgeadais:

Ús ar dhliteanais scéime	1,207
Aiscur tuartha ar Sócmhainní Scéime	-

### Is mar seo a leanas atá an anailís ar an méid a d'aithneofaí sa ráiteas iomlán gnóthachain agus caillteanais aitheanta:

Iarbhír lúide aiscur tuartha ar sócmhainní scéime	-
Gnóthachain agus caillteanais taithí	975
Athruithe i mbonn tuisceana	(2,174)
Gnóthachain achtúireacha aitheanta	(1,199)

### Tá anailís ar an ngluaiseacht barrachais le linn na bliana mar seo a leanas:

Easnamh amhail an 1/1/2004	(22,984)
Costas Seirbhíse Reatha	(571)
Íocaíochtaí Pinsin glan	570
Costas Seirbhíse Roimhe Seo	-
Costas Airgeadais	(1,207)
Gnóthas Achtúireach	(1,199)
Easnamh amhail an 31/12/2004	(25,391)

## 11. Nochtadh Idirbheartaíochtaí

Glacann Comhairle na hInstitiúide le nósanna imeachta de réir threoirilínite atá eisithe ag an Roinn Airgeadais maidir le leasanna a nochtáinn Comhaltaí na Comhairle agus chloígh Comhaltaí na Comhairle leis na nósanna imeachta sin le linn na bliana. Níor léirigh aon Chomhaltaí de chuid na Comhairle leas.

## 12. Dliteanais Teagmhasacha

Thionscain an tIar-Chláraitheoir imeachtaí dlí in aghaidh na hInstitiúide. Ní féidir toradh imeachtaí den sórt sin a thuar ná a dtionchar airgeadais, más ann.

## 13. Ceadú Cuntais

Cheadaigh an Chomhairle na Ráitis Airgeadais ar an 17 Meitheamh 2005.



# Tuarascáil an Ard-Reachtaire Cuntas agus Ciste le cur i láthair Thithe an Oireachtais

Tá na ráitis airgeadais ar leathanaigh 51 go dtí 60 iniúchta agam faoi Alt 28(3) den Acht um Institiúid Ard-Léinn, 1940.

## Freagrachtaí na Comhairle agus an Ard-Reachtaire Cuntas agus Ciste faoi seach

Tá freagrachtaí cuntasaiochta Chomhairle na hInstitiúide leagtha amach sa Ráiteas um Fhreagrachtaí na Comhairle ar leathanach 48. Tá sé d'fhreagracht ormsa tuairim neamhspleách a dhéanamh, bunaithe ar m'iniúchadh, i leith na ráiteas airgeadais a chuir an Chomhairle i mo láthair agus tuarascáil a fhoilsiú orthu.

Scrúdaím an ráiteas ar leathanach 49 agus 50 ar an gcóras um rialú inmheánach airgeadais le féachaint an léirithe ar ann gur chomhlíon an Institiúid treoir infheidhmithe maidir le rialachas corparáideach agus tuairiscím ar aon chás ábhartha nach ndéanann an Institiúid amhlaidh, nó más rud é go bhfuil an ráiteas míthreorach nó nach dtugann sé le faisnéis eile atá ar eolas agam de bharr na ráitis airgeadais a bheith iniúchta agam.

## An Bunús atá le mo Thuairim ar na Ráitis

I mbun m'fheidhme mar Ard-Reachtaire Cuntas agus Ciste, rinne mé m'iniúchadh ar na ráitis airgeadais de réir na gcaighdeán iniúcháireachta arna n-eisiúint ag an mBord um Chleachtais agus trí thagairt a dhéanamh do na nithe ar leith is gá a chur san áireamh agus a ghabhann le comhlachtaí stáit i ndáil leis an mbealach a bhainistítear agus a oibrítear na comhlachtaí sin.

Déantar scrúdú mar chuid den iniúchadh, ar bhonn tástála, ar fhianaise a bhaineann leis na suimeanna agus leis an méid a fhoilsítear sna ráitis airgeadais. Chomh maith leis sin, cuimsíonn an t-iniúchadh measúnacht ar na meastacháin agus ar na breitheanna suntasacha a rinneadh agus na ráitis airgeadais á n-ullmhú, agus measúnacht le féachaint an n-oireann na beartais chuntasaíochta don bhail atá ar chúrsaí na hInstitiúide, ar feidhmíodh na beartais sin ar bhealach leanúnach agus ar foilsíodh iad ar bhealach sásúil.

Phleanáil mé agus rinne mé m'iniúchadh sa chaoi is go bhfaighinn an fhaisnéis agus na mínithe ar fad a mheas mé a bheith riachtanach ionas go mbeadh leordhóthain fianaise agam a d'fhágfadh cinnteacht réasúnach ann go bhfuil na ráitis airgeadais saor ó mhíríteas ábhartha, cibé calaois nó neamhrialtacht eile nó earráid is cúis leis sin. I dteacht ar mo thuairim, rinne mé meastóireacht ar a shásúla is a cuireadh faisnéis i láthair sna ráitis airgeadais san iomlán freisin.

## Tuairim

Is é mo thuairim go raibh leabhair chuntais chuí coinnithe ag an Institiúid agus go dtugann na ráitis airgeadais, a chomhaontaíonn leo, léargas fíorcheart ar staid chúrsaí Institiúid Ard-Léinn Bhaile Átha Cliath ag 31 Nollaig 2004 agus ar a hioncam agus ar a caiteachas agus ar a sreabhadh airgid thirim don bhliain dar críoch sin.

## Gerard Smyth

*Le haghaidh agus thar ceann*

*Ard-Reachtaire Cuntas agus Ciste*

23 Meitheamh 2005





